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EVOLUTION DES SOCIETES HUMAINES DE LA PREHISTOIRE A LA PROTOHISTOIRE

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S3-H: Prehistoric occupations on river archives

Prehistoric occupations on river archives

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Fossilized and active river deposits cover major areas of the continental surface of the Planet. These deposits hold some of the most relevant keys of the human past. Since they are abundant, scaled and stratified they represent one of the richest archives of ancient human records. Despite many of the assemblages are not pristine, their position in the original geological and geomorphological context make them reliable to infer human occupation. Often, the combination of fluvial, eolian and volcanic dynamics allows the preservation of remarkable human behavior. It is possible to understand with great accuracy the formation processes of these sites. This can be achieved, namely, by integrating independent disciplines, methods, and techniques such as archaeology, geomorphology and sedimentology and absolute dates. Ultimately, it is also possible to infer with great detail the reliability and meaning of the prehistoric record. In this session, we will gather researchers working on fluvial and alluvial deposits to refine approaches, protocols, and methodologies in the scope of human and environmental past for the remaining 21st Century.

Mots-Clés: Prehistory, Fluvial deposits, Human record, River archive

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THE RELATION OF THERMAL ENGINEERING AND FROST CREEP TO MIDDLE PALEOLITHIC SITE LOCATION IN EUROPEAN CHALK LANDSCAPES

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Hominin living sites in the chalk landscapes of the cooler, drier climates of the Middle Palaeolithic are rare, despite a large number of 'open-air' sites with scattered flint artefacts. An examination of a sample of known cave or cliff shelter sites confirms that thermal considerations, including the perennial flow of spring water on south-facing sites were important location factors. Experiments on limestone show that there is a substantial thermal energy benefit to be gained from having multiple fireplaces at rock shelters, which is consistent with the archaeological record. The need for fuel is examined, indicating that co-existence with beavers could have played an important role in reducing the high-energy and time consuming procurement of firewood. Other forms of fuel are discussed, such as peat, mammoth dung (pellets) and bone. The question of candoluminescence of calcium oxide and calcium sulphate is discussed in relation to the use of wood and bone fires (bonfires) and the apparent under-representation of mega-fauna limb bones in the fossil record. Experiments on the illumination of fires using fresh bone mixed with seasoned firewood and all-wood measure the advantages of using bone as a complementary fuel and light source (with calcium oxide as a sub-product). The erosion of Upper Cretaceous Chalk and its influence on the landscape is reviewed, and the effect of 'Frost Creep' is analysed in relation to 'open-air sites', proposing that it is highly probable that this mechanism transported artefacts from original sites on steep scarp slopes. The advantages of higher living sites are examined in relation to the enhanced visual acuity of Middle Palaeolithic hominins. A survey of Middle Palaeolithic (MP) burial and flint extraction sites shows that manual excavation was common in soils and rock and it is suggested that living sites could have been enhanced through basic excavation on south-facing scarps in order to maximize the use of solar energy. Field studies in the chalk landscapes of Southern England and the Vanne valley of France were carried out in order to identify possible Palaeolithic scarp sites, the results indicating that, despite erosion, a pattern of 'stepped' level areas just above steep slopes, close to water sources and immediately up-slope from 'open-air' sites can be seen. Lithics were found associated with these zones. A simple desk-top methodology indicates that there are many similar areas close to known areas of occupation. Practically all 'open air' sites have been discovered during civil engineering works yet the systematic examination of scarp slopes in areas of known Middle Palaeolithic habitation has yet to be undertaken, despite the enormous time range of occupation and thus very high probability that 'good' escarpment sites that comply to a 'check-list' would have been used and modified. The location of potential sites in chalk landscapes is of importance to assist in their preservation.

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Mots-Clés: Prehistory, Fluvial valley deposits, Human record.

New Acheulean and Mousterian sites from the T4 terrace of the Lower Tejo River (western Iberia)

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Since the 19th Century, the sedimentary terraces of Lower Tejo River have been recognized as one of the best archives for the Lower and Middle Palaeolithic of western Iberia. In the 1940s, evidence for archaic human occupation was related to the Q3 and Q4 terraces. Since 2008, a maximum of six sedimentary terrace levels (T1 to T6, from older to younger) were identified, incised below a culminant basin-fill unit (corresponding to the ancestral Tejo River before drainage network entrenchment) and above the modern alluvial plain: T1, at +111 m; T2, +83 m; T3, +61 m; T4, at +34 m, with Acheulean in the basal and middle levels and Mousterian in the uppermost levels; T5, +18 m, with Mousterian industries through the entire fluvial sequence; T6, +10 m, with Mousterian industries in the lower deposits. The Q3 and Q4 terrace levels now correspond to T4 and T5. Terraces T6, T5 and the upper division of T4 are well dated by Luminescence. The upper division of T4, dated as c. 310 ka (base), to 155 ka (top), has several stratigraphic levels with Lower Palaeolithic industries at the middle and lower levels and Middle Palaeolithic industries at the top. The lower division of T4, consisting of gravels, has a probable age range of c. 310 ka to 340 ka or 460 ka (?) and contains very rare and crude quartzite artefacts. No evidence of archaic human occupations was yet found from the three older terraces. However, since in Spain evidence of archaic human occupation goes back to 1.6 Ma, the most

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probable explanation must be related to the limited surveying of these terraces. Furthermore, the archaeological data from T4 (Acheulean and Mousterian industries) is poorly known and systematized. Here, we present new Lower and Middle Palaeolithic sites, resulting from the surveys related to both preventive and research projects that, together with already existent data, enrich the dataset and allow refinement of the Acheulean-Mousterian transition in western Iberia. These new contexts are located in the sectors I and IV of the Lower Tejo (Portuguese sector of the Tejo/Tagus River). In sector I (further upstream), this evidence, which is all from the right margin, consists of Mousterian occupation and is covered by the Carregueira Formation (aeolian sands) in which Late Upper Palaeolithic to Neolithic remains are preserved, sometimes with features such as hearths. Sector II (from Arneiro to Gavião) and sector III (from Gavião to Arripiado) have not yielded relevant new evidence. In sector IV (from Arripiado to Vila Franca de Xira) all three new contexts are in the left margin and correspond to the Acheulean. One consists of two superimposed levels of lithic implements within the Acheulean of Alpiarça, the other is a layer in a remnant of the base of T4, just above the thick basal gravel and the third is an occupation in the base of the T4. This new evidence, together with previous data, provides fundamental data that provides a refined framework for the Lower and Middle Palaeolithic in western Iberia.

Mots-Clés: Western Iberia, Tejo River, Acheulean, Mousterian

Step by step analysis of a stepped river terrace site: new results from the Acheulean site of Cagny-l'Épinette (Somme Valley, France)

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The *stepped Quaternary fluvial terrace system of the Somme Valley* (northern France) hosts several Middle to Upper Pleistocene sites, thus offering many opportunities to study the potential of archaeological records in alluvial context.
This paper will focus on the open-air site of Cagny-l'Épinette in the Middle Somme Valley. Thousands of artifacts and faunal remains have been unearthed from its fine-grained fluvial deposits (MIS 9), at the external part of the terrace near a chalk talus. Despite their apparent freshness, their status has been a continuous debate topic. While some saw pristine Acheulean assemblages, others considered them as mixed reworked remnants of different sites.

Through the presentation of the latest analyses conducted at Cagny-l'Épinette, we will discuss the challenging task of deciphering archaeological assemblages embedded in alluvium. As part of a new research project (2016–2021), the first site-wide multi-criteria spatial analysis of Cagny-l'Épinette was performed to provide a new insight into the overall Acheulean assemblages. Several features were then considered for both lithic artifacts and faunal remains, as individuals and as part of refittings: grain-size, orientation patterns, surface alterations, breakage patterns, anthropogenic marks and skeletal part representation.
Our results suggest one archaeostratigraphic level affected by a post- or sym-burial, vertical size-sorting process. Furthermore, although local disturbances have been identified, the results allow to exclude high energy fluvial or slope processes or intense activity by non-human carnivores before burial. Thus, hominins can be considered as the primary actor in the site formation process. These outcomes help further understanding of the inherent complexity of formation dynamics of sites settled within fluvial terrace systems, and thus, of their archaeological potential.

Mots-Clés: Cagny l'Épinette, Middle Pleistocene, Fluvial terrace, Site formation processes, Spatial analysis, GIS

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Poço Rockshelter

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Poço Rock Shelter is located in the karstic canyon Chitas, at 25 km from the present shoreline and ir part of the River Lis basin (central western coast of Iberia). This site was discovered in 2002 and the archeological test pits made in the platform between it and the stream showed its potential for preserving remains of Prehistoric hunter-gatherers.
Between 2015 and 2018, the site was excavated in the scope of the new project Ecoplis – Human Occupations in the Pleistocene Ecotones of River Lis reveling two overlapping occupations each onde specificallhy related with two climatic crises: the Henrich Event 1 and the 8.2 event.
Here we present the lithic assemlbages of both occupations. The Solutrean occupation is mostly composed of flint and related with exploitation of the outcrop right above the site for the production and exportation of bifacial tips and blades. After this occupation the area suffered a strong erosion marked by the absence of sedimentation and roof collapses. The site was then occupied during the Epipaleolithic for the intensive consumption of marine resources, resulting on a wider diversity of lithic raw materials and domestic stone tools.

Mots-Clés: Solutrean, Epipaleolithic, Rockshelter, lithic assemblages

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S4-B: Transversality in Anthropology – Updates on methodologies, technological developments and discoveries

BILAN DE L'ÉTUDE DES RESTES HUMAINS FOSSILES DE LA CAUNE DE L'ARAGO, TAUTAVEL, FRANCE

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Entre 1964 et 2020, 151 restes humains ont été découverts au cours des fouilles dans la Caune de l'Arago à Tautavel (Pyrénées Orientales) dont l'âge est compris entre 580 000 pour les restes les plus anciens de la grande unité archéostratigraphique, jusqu'à 300 000 ans pour les restes les plus récents dans la grande unité archéostratigraphique C.
Par leurs caractéristiques anatomiques ils peuvent être rapportés à des *Homo erectus* européens évolués. En effet, ils partagent des caractères communs avec les formes *d'Homo erectus* connus en Asie et en Afrique : comme la forme cranio-faciale et en particulier les caractères des mandibules, une grande extension de l'arcade alvéolo dentaire à convexité antérieure, un corps mandibulaire avec un indice de robustesse élevé, un planum alvéolaire sub-horizontal et une ligne mylo-thyroïdienne saillante peu inclinée. La boîte crânienne présente une face très prognathe, une forme pentagonale. La découverte de très nombreuses dents confirme cette attribution.

Nous sommes en présence d'une nouvelle forme qui ne permet pas de la rattacher à l'*Homo heidelbergensis* attribué à la mandibule de Mauer.

La population des *Homo erectus* européens évolués dans la Caune de l'Arago se caractérisent par un très grand nombre d'enfants, avec une forte mortalité entre 7 et 12 ans et la présence d'adultes entre 18 et 30 ans. L'espérance de vie était d'environ 20-25 ans. Un seul individu est décédé à l'âge de 40 ans environ.
D'autre part, il est intéressant de souligner la présence de nombreuses dents déciduales perdues naturellement du vivant des enfants qui séjournaient dans la grotte.

Mots-Clés: Homo erectus, Tautavel, Arago

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Apport de la scanographie à l'interprétation embryologique de la base du crâne et de son évolution posturale chez les hominiens/ Contribution of the computerized tomography to the embryological interpretation of the skull base and its postural evolution in hominins

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Chez l'*Homo sapiens* Linnaeus 1758, la période embryonnaire dure 8 semaines, elle serait plus courte chez les paninés (*Pan* et *Gorilla*). La compréhension de l'origine phylogénétique de notre embryogenèse nécessiterait de pouvoir l'étudier chez les espèces fossiles. Or il ne reste que des fragments d'os, adultes le plus souvent, ce qui peut constituer un obstacle. Il existe pourtant une méthode développée au Muséum national d'Histoire naturelle de Paris depuis plus de 30 ans, validée par l'Académie des sciences de l'Institut de France (1988, 2006), la chaire de paléoanthropologie et de préhistoire du Collège de France (Yves Coppens, 1996) et plus récemment par l'Habilitation à Diriger des Recherches (2011). Cette méthode mise au point avec la téléradiographie et des statistiques, bénéficie désormais de l'application de la scanographie aux collections ostéologiques.
Comment retrouver l'embryogenèse d'un crâne fossile ? Aux stades embryonnaires, le crâne se limite à la base cartilagineuse, plane chez tous les vertébrés, alignée sous le tube neural dans l'axe horizontal de l'embryon. Au terme des 8 semaines chez l' *Homo sapiens*, le segment postérieur (basi-sphénoïde, basi-occipital, capsules otiques) est redressé, basculé vers l'avant et le bas. Cette verticalisation conditionne la position du tronc cérébral et de la moelle épinière ainsi que celle de la future loge cérébelleuse, alors que le système nerveux sus-jacent n'a pas encore d'hémisphères cérébraux. Cette découverte a invalidé le paradigme de la poussée encéphalique de Franz Weidenreich (1948) vue comme la première cause mécanique du redressement. La rotation vers le bas se fait en deux temps. Un nouvel angle a été défini pour mesurer la première rotation avec des téléradiographies. La tomographie permet pour la première fois de chercher les corrélations entre l'amplitude de rotation du sphénoïde et celle des os connexes para-sagittaux (les pyramides pétreuses) et de les comparer entre des taxons actuels et fossiles. Le protocole biométrique a été appliqué à une série d'âge croissant de chimpanzés (collections Institut de Paléontologie Humaine, n= 41), à une patientèle d'adolescents et d'adultes de l'Hôpital Américain de Paris à part égale d'hommes et de femmes (n = 55) ainsi qu'à des scanners de crânes fossiles suffisamment

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conservés pour reconstituer leurs trajectoires embryonnaires, soient 5 *Homo neanderthalensis* et 2 *Homo sapiens* du Pléistocène supérieur (collections Muséum national d'Histoire naturelle) et 3 *Homo erectus* javanais du Pléistocène moyen (programme "Hominids in the Quaternary: Environments and Behaviours" de l' UMR 7194 CNRS en Asie du Sud-Est dirigé par François Sémah).

Si le redressement embryonnaire entre le chimpanzé et *Homo sapiens* est indéniable, il fallait le mesurer pour *Homo erectus* et *Homo neanderthalensis* car leur loge cérébelleuse est plus élevée que sapiens. Les angles sont plus ouverts. Les conclusions taxonomique et posturale sont simples : 1○ l'identification de sapiens dans le registre fossile doit commencer par la mesure des angles de rotation embryonnaire, la forme et le volume de la voûte crânienne étant plus tardifs dans la chronologie du développement et 2○ l'équilibre postural des *Homo erectus* et Néandertaliens assuré par leur cervelet était différent de sapiens.

Mots-Clés: scanographie, base du crâne, embryogenèse, Homo sapiens, Homo erectus, Homo neanderthalensis, équilibre postural, cervelet

Digitisation and reconstruction of the burial of newborn twins from the Gravettian site Krems-Wachtberg

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In 2005, an exceptionally well preserved burial of neonate monozygotic twins was uncovered at the Gravettian site Krems-Wachtberg in east Austria in the course of systematic excavations conducted by the Austrian Academy of Sciences. The infants were embedded in red ochre and carefully deposited in a burial pit covered by a mammoth scapula. Individual 1 was adorned with ivory beads while individual 2 was attributed with pierced mollusk shells and fox tooth. While individual 2 died at birth, individual 1 survived for about 50 days. While the general grave construction and layout, as well as personalised adornments reflect treatment not uncommon for contemporaneous burials, re-opening of a grave and secondary burial demonstrate a new facet of Gravettian mortuary behaviour.
Upon discovery, the finding was only superficially exposed and then recovered as a block and stored in a climate-controlled storage facility of the Natural History Museum Vienna. Excavation of the block was conducted but in 2015. Hereby, careful exposure and recovery of the skeletal elements were accompanied by continuously produced structured-light 3D surface scans. This documented the exact position of all elements.

An interdisciplinary pilot project aiming at digitisation of the elements, reconstruction of the skeleton, as well as archiving and sharing the produced data was launched in 2018. High resolution imaging of the individual bones is performed at the Division of Biomechanics of the Core Facility Campus Krems using a SkyScan microCT-scanner. The surface scans generated during excavation of the burial are then used to reconstruct the elements' original positions. At

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present, we focus on the left hand and the cranium of individual 2. The former is represented by sixteen preserved carpals, metacarpals, and phalanges for which the find positions were restored. The cranium is fragmented and partly collapsed, so that reconstruction of its anatomical shape requires using geometric morphometrics. We intend to make the resulting data accessible in an open-source database that will be structured for addressing different target groups ranging from interested non-specialists to experts in the fields of archaeology and palaeoanthropology.
The Krems-Wachtberg twin burial provides the rare opportunity for studying both neonate anatomy and cultural behaviour of early modern humans. Moreover, digitisation and reconstruction of the skeletons will allow for ontogenetic and phylogenetic comparisons with other subadult early modern humans and Neandertal infants, and will therefore set a basis for future research.

Mots-Clés: burial of newborn twins, early modern humans, high resolution imaging, digital reconstruction, open source database

Review on the genetic History of Algerians within North African Populations from the uni-parental genetic markers (mt DNA and Y-chromosome) Point of View. Contribution of biological anthropology to the study of the Maghreb settlement.

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The Maghreb was the ground of the most extraordinary and complex civilizations of the Mediterranean basin, still giving rise today to a great enthusiasm for the study of the history of its populations and the human settlement of the various neighbouring regions. Due to the diversity of its ethnic groups and the quality of its deposits, it has also become a privileged center of interest for research on the origins of human being and his ancestors.
Data from genetic analyses of genomes from ancient and contemporary populations in North Africa highlight both a very high degree of genetic heterogeneity and a complexity of human movements.

This communication aims to take stock of knowledge on the genetic history of Algerians within North African populations by gathering the most important published results related to mt DNA and Y-chromosome analysis.

These results revealed a strong genetic relationship between studied North African populations (Algeria, Morocco and Tunisia). Such evident genetic affinity between North African populations, also proved by the use of other powerful autosomal markers, agrees with historic data considering North African populations as having similar origins.

Comparative analysis of Maghrebian and Mediterranean genomic sequences shows a pre-neolithic genetic structure represented by northern maternal lines in the present Maghreb individuals, particularly Algerian and Moroccan with a significant Eurasian component and a small substantial contribution from sub-Saharan Africa. This typically Mediterranean genetic profile, similar to that of prehistoric individuals from the same geographical area, thus confirms long-term genetic continuity in the region and reinforces prehistoric migrations in the Maghreb from the Levant and Europe.
The analysis indicated also a genetic link between North African populations (Algeria, Tunisia and Morocco) and the populations of the South-Western Europe particularly the Basques and

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Spaniards. This would reflect a Neolithic relationship between Iberians and the natives of North Africa (the Berbers).

Mots-Clés: Genetic History, Biological anthropology, uni, parental genetic markers (mt DNA and Y, chromosome), North Africa, Algeria.

L'importance de l'imagerie dans la connaissance architecturale cranio-faciale et de la posture occlusale des populations fossiles et actuelles.

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Afin de rendre la lecture mécanique et dynamique des différentes pièces du puzzle-cranio-facial (voûte, face et base du crâne) plus lisible au cours de l'ontogenèse, l'analyse biométrique du crâne, de la face et de l'occlusion a été complétée par la mise en place d'une méthode géométrique architecturale numérisée par le biais de l'imagerie médicale. Cette dernière, d'abord en 2 D de profil puis en 3 D dans le cas des asymétries, illustre après analyse, les rapports des structures profondes internes sur un terrain en harmonie ou en dysharmonie et de déterminer les causes d'un déséquilibre dont les effets en cascade modifieront la posture occlusale. Plusieurs phases sont ainsi décrites depuis l'analyse dentaire (dysmorphoses dentaires et squelettiques) en passant par le repérage architectural biométrique par analyse radiographique. Cependant l'essentiel de cette étude biodynamique passe par deux étapes indispensables : une analyse macroscopique de la rotation de chaque os au cours du développement (rotation interne ou externe, du maxillaire, asynchronisme des hémi-maxillaires, position du maxillaire et ses relations avec l'ATM et l'arcade zygomatique, frontalisation des pyramides pétreuses, asynchronisme des temporaux dans le cas des asymétries basicrâniennes, ...) et une analyse des rapports métriques et angulaires des dynamiques de flexion et d'extension par téléradiographie (mouvements de l'angle sphénoïdal, morphologie des processus clinoïdiens, mouvements autour de la selle turcique, rotation et bascule de l'écaille occipitale, mouvements antéro-postérieurs de prognathie et de rétrognathie ...).
Cette méthode a été appliquée à plusieurs centaines d'individus des deux sexes et de tous âges, provenant de populations contemporaines d'Île-de-France, du Moyen-Âge du Bassin parisien et du Pléistocène et de l'Holocène du Maghreb. La banque de données d'images téléradiographiques de profil sert aujourd'hui comme référence aux chercheurs et aux étudiants d'Anthropobiologie et de paléoanthropologie, de médecine dentaire et d'Ostéopathie.

Mots-Clés: Imagerie, paléoanthropologie, crâne/face, posture occlusale., Bassin parisien, Maghreb.

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Intérêt de l'imagerie dans la biomécanique normale et pathologique de l'avant-pied. Aspects du vivant et des populations du passé.

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La morphologie de l'avant-pied présente une variabilité qui n'est pas synonyme de pathologie. Ainsi " l'*Hallux valgus* " est une caractéristique anatomique spécifique du genre *Homo* et n'est justifiable d'un traitement uniquement en présence de symptômes s'y rattachant. La difficulté que rencontrent les paléopathologistes est liée à l'incomplétude et muet du matériel examiné. Il faut alors réunir les critères morphologiques statistiquement et habituellement associés à la présence de symptômes dans la population actuelle pour identifier les probables patients des populations du passé. C'est l'objet de ce travail, centré sur le *metatarsus varus* avec transfert mécanique de charge sous les rayons latéraux, l'atteinte de la plaque plantaire, la position de l'*hallux*, la morphologie de l'arche transversale de l'avant-pied.
Outre les nombreuses variations qui découlent de la station debout, l'*hallux valgus* est présent dans de nombreuses populations archéologiques. Les exemples identifiés dans le matériel issu des fouilles préventives du Sud-Est parisien suggèrent, malgré la désarticulation des os du pied, des pistes de reconstitution articulaire.

Mots-Clés: Imagerie, hallux, biomécanique, paléopathologie

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The human remains from Ciota Ciara Cave (Piedmont, Italy)

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The Ciota Ciara cave (Piedmont, Italy) represents the oldest evidence of human presence in Piedmont. This site, excavated for more than 10 years by the University of Ferrara, has contributed to the understanding of the subsistence behaviors of prehistoric populations in this region. Recently, radiometric dating has allowed to precise the chronological range of the human occupations of this site around 300,000 years BP. This period located at the beginning of the Middle Paleolithic is a key moment in the evolutionary history of Europe showing a great morphological variability within hominins (possibly grouped under the taxon *Homo heidelbergensis*) at the time of the emergence of Neandertals. Fortunately, during the last excavation campaign in the Ciota Ciara cave, a total of four human remains were discovered: three permanent teeth (a lower incisor, an upper canine, and an upper molar) and a nearly complete fragment of occipital bone. We present here, for the first time, the preliminary results of the morphometric analysis of these human remains and comparison with a reference collection composed of European Middle and Upper Pleistocene specimens. The morphological comparison was mainly based on the evaluation of their "Neandertalisation process" to contribute to the discussion about the tempo and mode of the development of the Neandertal lineage in Europe during the late Middle Pleistocene.

Mots-Clés: Middle Pleistocene, Neanderthals, Middle Paleolithic, teeth, occipital bone

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A Phylogenetic Networks perspective on reticulate human evolution

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No consensus exists in human evolution research regarding the definition of genus *Homo* and its mode of evolution. We present a methodological phylogenetic reconstruction approach combining Maximum Parsimony and Phylogenetic Networks methods applied to phenotypic craniodental characters of 22 hominin species from Late Miocene to Holocene. The approach consists in selecting and validating first a tree-like most parsimonious scenario out of several parsimony runs based on various numerical constraints. We identify three *Homo* genus definitions based on various cumulative distinguishing apomorphies in support of last common ancestors (LCAs), and highlight the results by a novel graphical elliptic representation. An intermediate step is implemented by running an analysis with a reduced apomorphous character dataset that generates multiple parsimonious trees. These most parsimonious trees are in turn used as input for a Phylogenetic Networks analysis that produces consensus and reticulate networks. We show that the phylogenetic tree-like definition of the genus Homo is a relative concept linked to craniodental characters in support of hypothetical LCAS of the most parsimonious scenario. For the late Miocene-Pliocene taxa up to *Au. africanus*, the Phylogenetic Networks method shows no evidence of diffuse ancestral radiations but rather directional adaptive changes with uncertain cladogeneses. But more importantly, the method comes in support of a probable web-like reticulate mode of evolution of the genus *Homo* that gave rise to the emergence of the only surviving paleospecies, *Homo* sapiens. Our results related to the *Homo* reticulate network concords with recent findings in paleogenomic research regarding its mode of evolution.

Mots-Clés: Genus Homo definitions and mode of evolution, Maximum Parsimony, Phylogenetic Networks.

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Phylogenetic analysis of Homo luzonensis: taxon, characters, phylogeny, and island evolution

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Homo luzonensis is a species that lived until at least 50,000 to 67,000 years ago in northern Philippines, East of the Wallace line [1]. Likely to have been isolated on Luzon Island for tens to hundreds of thousands of years, they show both archaic features (i.e., occurring in the australopiths) and derived characters (i.e., occurring in the upper Pleistocene Homo species). Their archaic features could result either from a close phylogenetic relationship with the Australopithecines or the early members of the genus Homo. It may also result from the effects of island evolution that favored reversals (i.e., return to primitive characters), correlated with a close phylogenetic relationship with a more derived hominin species (e.g., Asian Homo erectus). To test these two main hypotheses, we carried out a cladistic analysis based on the dental (premolars and molars) and postcranial (hand and foot bones) remains of adult H. luzonensis and most of the modern and fossil species recognized in the family Hominidae. The matrix used for this analysis contains characters frequently found in paleoanthropological studies, such as frequency-defined ASUDAS characters [2], and new characters we created to describe hand and foot remains. The various trees obtained indicate that both hypotheses are possible. The phylogenetic hypotheses where H. luzonensis is derived from H. erectus are
supported by higher retention index and average group support after symmetric resampling. However, those where H. luzonensis is basal to the whole Homo genus are obtained using implied weighting [3], a method whose relevance is discussed when island taxa are analyzed. Moreover, H. luzonensis probably had reduced body dimensions and adaptations of his locomotor repertoire which have parallels in other insular mammals [4]. Besides, the tropical forest environment present on Luzon Island [5] could have favored the selection of such features. Combining our results with the state of the art concerning the hominin fossil record in Asia, island evolution and the environmental context of H. luzonensis, we conclude that H. luzonensis most probably results from an insular evolution with an Asian H. erectus ancestor.

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Mots-Clés: Phylogenetic analysis, Homo luzonensis, taxon, characters, phylogeny, island evolution

Jebel Ihroud and others. The First human settlements in North Africa

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Datations obtained for Jebel Ihroud around 300ky (Richter et al, 2017), are important for the comprehension of the origin and settlements of *Homo sapiens* species in and out of Africa. These hominines are globally contemporaneous to others African human remains as Rabat-Kebibat in Morocco, Kabwe in Zambia, Laetolil LH18, Bodo or Ndutu in East Africa. Phylogenetic position of Jebel Irhoud previously studied in the context of the human settlements of Morocco (Hublin et al 1987, Hublin et Tillier 1988, Hublin 1993), results updated with the discovery of Jebel Irhoud 10 (Hublin et al, 2017). Only some aspects of the endocranial approach studied as, for example, cranial capacity estimation (Holloway, 1981) or morphometrical study on Jebel Ihroud 1 (Bruner & Pearson, 2013). New morphological analysis of both endocasts of Jebel Ihroud 1 and 2, adding to morpho-geometrical and cladistics (Mounier et al, 2016) views, integrating recent results on endocasts from and Kabwe (Balzeau et al, 2017) produced. Waiting results allow introduce some hypothesis to a better understanding of the first North African human settlements.

Mots-Clés: Homo rhodesiensis, Homo sapiens, Africa, endocast, cladistics, human settlements

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PRELIMINARY RESULT OF THE " ORIGINS OF SPEECH " PROJECT

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The speech abilities of fossil hominins are one of the oldest and most challenging questions in palaeoanthropology. The theory of " laryngeal descent " has long been used to explain human singularity. However, recent work has shown that some non-human primates were " speech ready

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". The organs and soft tissues of the vocal apparatus are not preserved in the fossil record. This is why, to understand human-like speech capacity, we have developed a project untitled " Origins of speech ", mainly supported by the institute of computing and data sciences (ISCD) of Sorbonne University, based on the bony articulators of speech. It aims at inferring soft tissue of the vocal tract (mainly the tongue and the pharyngeal walls) in fossil hominins based on the bony structure of the head, using transformation models from soft tissues (recorded with MR imaging) and bony structure (CT scans) of a living *Homo Sapiens*. These transformation models are evaluated and validated on data recorded from non-human primates, in which both soft tissues and bony structure are preserved.

This multidisciplinary research involves palaeoanthropologists, biomechanicians, specialists in speech sciences, mathematical modeling and mathematicians. We present the preliminary results of this work, which aims at generating a Finite Element tongue model of the La Chapelle-aux-Saints Neanderthal specimen by transforming an existing model of a modern *Homo sapiens* using 3D image registration. Then we expect to quantify the parametric uncertainties resulted from the tongue model generation by a non-intrusive approach.

Moreover, we are seeking to test the consequence of a vertical posture on human elocution faculty. We focused on an anatomical study (2D-3D) to test the relationships between bone structures within primates using a series of skeletons from the collections of the *Muséum national d'Histoire naturelle* to understand the geometry of the vocal apparatus (bone substrate) within the cranial complex and regarding the cervical spine (head position), and to carry out comparisons between genus (*Homo*/*Pan*/*Gorilla*/*Papio*) and species (*Homo sapiens*/Neanderthals).

Mots-Clés: palaeoanthropology, speech abilities, orignis of speech, Homo sapiens

S5-A: New methods for exploring flint mines - From producers to consumers, from Prehistory to History

Les minéralisations plombo-argentifères du massif de Jbel Addana exploitées pendant les périodes médiévales et leur relation avec l'épanouissement de la cité de Tamdûlt (Akka, Anti-Atlas occidental)

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Depuis l'antiquité, la région d'Akka est connue pour d'importants travaux miniers et une forte activité commerciale. Elle était classée parmi les endroits de première importance commerciale du Maroc médiéval et située sur l'une des voies principales du commerce transsaharien durant cette période. La cité de Tamdûlt se situe à 15 km au SW de la Commune d'Akka, Province de Tata. Elle était considérée comme un très grand centre urbain et une cité minière et caravanière entre le IXème et le XIVème siècle. D'après les sources historiques, la fondation et l'accroissement de Tamdûlt est en relation avec l'exploitation de richesses minières du Jbel Addana situé à environ 20 km au Sud de la Commune d'Akka, dont il forme un relief allongé d'une quarantaine de kilomètre le long du quel se situe de nombreuses structures géologiques recèlent d'importantes minéralisations plombo-argentifères.
L'exploitation ancienne est marquée par l'existence de vestiges importants de vieux travaux et certaines sources suggèrent un début de travaux dès la fin du IXème siècle, voire avant et semble s'être poursuivie jusqu'à l'heure actuelle. Or, depuis la fin du siècle dernier, l'activité minière a connu une décroissance importante dans ce secteur vue les conditions de travail devenues difficile (exploitation artisanale, l'approfondissement des travaux). Par conséquence, des réserves importantes sont encore susceptibles d'être exploitées. Les sources historiques et les traditions orales ont également indiquées que les fonctions de Tamdûlt sont très variées, et elles amènent à conclure qu'elle n'était pas seulement une cité minière mais un centre urbain fleurissant et une plateforme incontournable dans le commerce transsaharien. Il est difficile de fixer la date de la fondation et les activités de la cité de Tamdûlt seulement d'après les traditions. Il faut des études archéologiques de détail pour mettre en exergue l'histoire de la cité.

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Afin de valoriser le potentiel économique des minéralisations en place et l'histoire de l'exploitation minière ancienne et leur relation avec l'épanouissement de la cité de Tamdûlt, une étude approfondie à deux aspects a été proposée. D'une part l'étude s'intéressera à la caractérisation pétrographique et minéralogique de la minéralisation en place et des résidus de l'exploitation ancienne (scories), et d'autre part elle sera doublée par une caractérisation géochimique des différents matériaux (minerais, scories et objets) qui aboutira à l'attribution d'une signature isotopique à chaque matériau.

Mots-Clés: Jbel Addana, minéralisations plombo, argentifères, Akka, Tamdûlt

Contribution of palaeoenvironmental studies to the socio-economic context of mining at the Neolithic flint mine of Spiennes.

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The archaeological excavations conducted during the last 23 years on the Neolithic Flint mines of Spiennes (Mons, Belgium) offered the opportunity to undertake palaeoenvironmental research. The abundant data collected through palynology, anthracology, carpology and archaeozoology allowed not only to reconstruct the past landscapes but also to better understand human-environment relationships.
At the time Neolithic mining took place in Spiennes (4 200-2 200 cal BC) the plateaus of the Mons basin were densely wooded with linden forests rich in hazel trees. At the local scale anthracological, palynological and malacological analyses showed a semi-wooded environment with shrubs and trees growing in open areas. Such spectra indicate recolonisation by pioneer vegetation after clearings in the surroundings of the shafts while mining activities occurred at the site.

Palaeoenvironmental studies contribute also to document the status of the communities involved in mining. Studies of the faunal remains discovered in the backfilling of shafts attest the presence of perinatal domestic animals, which suggests onsite animal husbandry. This assumption is further supported by the pollen data which record plant types from grazed meadows and quite high proportions of spores typical of fungi growing on animal dungs. Crop cultivation on the plateau is also attested by the findings of seeds and pollen of cereals, but also pollen of crop weeds and other taxa associated with harvest.
There is converging evidence of the presence of human settlements in the direct vicinity of the mines and the involvement of these local communities in the extraction activity. Accordingly, and in the light of the material evidence of a mining tradition already exposed for this major site, the palaeo-environmental data support the hypothesis of controlled access to the extraction site by local populations.

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Mots-Clés: flint mine, Neolithic, socio, economic context, Paleoenvironment

Testing the Multi Layered Chert Sourcing Approach: How reproducible are geochemical chert provenance analyses?

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There exist only few materials that allow for a comprehensive study of prehistoric resource management and consequently past human behaviour. Amongst these materials are chipped stone tools, which are an excellent means for this endeavour due to their durability and abundance predominantly at Stone Age sites. Reconstructing the complex processes underlying lithic economy requires the investigation of mechanisms involved in the procurement, use and distribution of lithic raw materials. The first and indispensable step in studying lithic economy however concerns the starting point of this continuum, the aspect of procurement, which crucially depends on the ability to trace these materials back to their original sources. During the past decade, we employed the Multi Layered Chert Sourcing Approach (MLA) combining petrography, microfacies analysis and geochemistry for sourcing chert materials in archaeological contexts. Since the beginning of our studies, we use Laser Ablation-Inductively Coupled-Mass Spectrometry (LA-ICP-MS) for trace element detection. Following the Provenance Postulate, the elemental composition within the material of a particular source or source region needs to be characteristic enough to enable a clear differentiation from other, visually similar geological deposits. In order to assess the reliability of our approach, we re-analysed samples from previous sourcing studies in a blind test. This is the only secure way to determine the reproducibility of results from geochemical chert provenance analyses in archaeology, and to validate socio-economic interpretations based on such outcomes. Our test study is one of the first of this kind, and provides future perspectives for lithic raw material sourcing.

Mots-Clés: lithic economy, chert procurement, chert sourcing, geochemistry, blind test

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Siliceous rocks mining, using and identification – short overview of a history of archaeological friendship between humanities and natural sciences

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Archaeology, as a scientific discipline, is quite young and is classified as a humanities discipline. But when it was developing the main core of sciences disciplines was already stable and solid so archaeology took some from each of the disciplines. Each "old science" had, and still has, its impacts on creating this "new science". It is especially seen in researches concerning prehistoric communities' uses of siliceous rocks.
Poland has a long history of cooperation of humanities with natural science. From the very beginning prehistorians, historians, collectors, and amateurs work together with geologists, physical anthropologists, and researchers of earth sciences. In Poland, the most known example of such cooperation is the partnership between Stefan Krukowski (archaeologist) and Jan Samsonowicz (geologist). Nevertheless, it is not the only example of friendship between humanities and natural science in the history of archelogy in Poland. Marian Wawrzyniecki was the first who used 1903 the term "obsidian" in his publication concerning archaeological materials from the site Wężerów. Determination of the type of raw materials of discovered items Wawrzeniecki owes to Jan Lewiński (1876-1939), a geologist, and the founder and first director of the Geological Laboratory, part of the Museum of Industry and Agriculture in Warsaw. Similarly, also other archaeologists of the period appreciated the benefits that came from cooperation with representatives of other disciplines, such as geologists, physical anthropologists, and botanists.

In this presentation, we will present an overview of the main points of contact between researches from humanities and natural science in Polish research on the uses of siliceous rocks in prehistory. Their impacts on the shape of today's research on siliceous rocks: its sources and identification, as well as mining and use by prehistoric communities.
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Mots-Clés: siliceous rocks, flint, obsidian, history of archaeology, Polish archaeology

Defining the Limits of Raw Material Extraction in Prehistoric Bedrock Quarries: A Petrofabric Approach.

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Unquestionably, the most steadfast and reliable principle adhered to in lithic analyses is the presence of the taxonomic flake scar, indexed by the conch shaped hertzian cone. This feature, ever present on flaked stone tools, represents the base line for all further analyses of prehistoric implements. A common prejudice in lithic analysis studies is that if a flake scar does not exist on a worked piece of raw material, then the object is not yet an artifact. Instead it is categorized as an object modified only by natural processes, such as freeze thaw.
Detailed analysis of archived collections excavated at numerous prehistoric bedrock quarries, in the eastern United States, have shown worked objects at various phases of ore processing, without the characteristic flake scars. The lack of a flake scar has unfortunately caused many scientists to reject the object as meaningful archaeological remains. In addition, the lexicon of terminology ascribed to the definition of quarry debris remaining behind from extraction and refinement processes is strikingly limited, and typically descriptive of the shape of the debris at hand. The descriptions of quarry tailings includes ambiguous terms such as chunk, block, shatter, waste flake, and trim. Although these terms serve to describe the overall morphology of quarry tailings, they do little to explain the organization of the early and intermediate phases of the chain of operation. This circumstance unfortunately leaves the quarry vacant of all human behavior, due to the absence of a lively terminology that describes the early to intermediate phases of extraction (Zone 1), milling (Zone 2), beneficiation (Zone 3), processing (Zone 4) and refinement (Zone 5). We propose the adaptation of an economic geology approach to the analysis of prehistoric quarries and their associated tailings.

Our investigations suggest that there are sound geological reasons that would explain the absence of flake scars in the early to intermediate phases of ore processing at quarry sites. Initially, raw material removed from the Zone 1 is processed to remove country rock and enrich the ore block by removing waste that is not the intended production target. Processing will not produce flake scars in the raw material, but instead will result in microlithon packages of enriched ore, the dimensions of which are controlled by the level of tectonic deformation (number of intersecting

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foliations), degree of diagenetic recrystallization, and/or hardening or sealing of foliation due to incursions of chemically reactive fluids. Bipolar crushing of enriched ore at Zone 3 through Zone 5 will result in the separation of unsealed microlithon packages, reducing the ore target volumetrically until a single, flakable unit is produced. It is this flakable unit that is then capable of recording a flake scar when purposefully struck by a technician. As such, the flake scar characteristically does not make its appearance until the raw material has reached the final phases of refinement (Zone 5) at prehistoric quarries and is ready to be removed from the quarry to nearby workshops and support sites. This is significant in that entire sections of the lithic chain of operation have gone unrecognized in previous investigations. Until this is remedied, lithic analysis at quarries will begin with the appearance of diagnostic bifaces and cores.

Mots-Clés: Raw Material Extraction, Prehistoric Bedrock, Petrofabric Approach

S6-B: Traceology in the 21st Century: Contributions to Archaeological Science and the Human Journey

Simulation of prehistoric drilling and bead manufacturing

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Abstract: The poster focuses on a series of experiments in drilling different materials undertaken to test several practical issues. two main categories of artefact are recognized as having been involved in prehistoric drilling activities. The first beads and other decorative and prestigious items made of bone, shell, pottery and various minerals. The second consists of toolkits of micro-perforators/borers found among the flint assemblages of several sites in Bulgaria and displaying ambiguous traces of use. A series of micro-borers were produced and used for manual and mechanical drilling (with a pump drill). The repertoire of worked materials comprised samples (mainly prepared thin plates) of minerals and rocks, ranging in hardness (on Mohs scale) from 3 (marble, limestone, calcite) to 6.5 (amazonite, nephrite). Biominerals – aragonite (shells) and apatite (bones) – were also used. The simulation of drilling and bead manufacturing resulted in 16 delicate beads of 5 different materials using fine sand and water abrasion. Though not conclusive, the experimental work was instructive in many of the parameters and procedures of prehistoric drilling as well as in the forms of microwear that developed on both drills and drilled materials.

Mots-Clés: Prehistoric drilling, micro, perforators/borers, pump drill, experiments, beads, (bio)minerals, use, wear

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An inverted perspective: identification of flints used in the production of bone and antler tools. The case of the Dąbki site, Poland.

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The overwhelming majority of Palaeolithic and Mesolithic sites recorded on the North European Plain are composed exclusively of lithic assemblages. The reason for this appears to be due to the specific environmental conditions in which archaeological remains were deposited, namely acidic fluvio-glacial sandy-gravelly-clayish deposits that quickly dissolve any organic matter. Numerous macro- and microscopic surface trace studies have been conducted with the aim of the identification of micro-wear traces visible on flint tools and the classification of these traces. The basic trace categories are related to the main groups of materials processed on the site, like wood, hide, bone or antler. Even with these studies, it is practically impossible to take the next step forward and interpret what exactly the object may have been used for. However, this difficulty can be overcome by research of peatbog sites located next to biogenic deposits filling river valleys and lake basins that preserve artefacts made of organic materials. One such site is Dąbki, in northern Poland, on the southern Baltic coastal zone. The palegeographic context of the site appears to be an island within an ancient lake. Almost twenty years of archaeological research has led to the recovery of tens of thousands of animal bones, including a rich collection of bone and antler tools. This fortunate circumstance allows us to conduct a microwear study from a reverse perspective: instead of starting with a flint tool and finishing with some general conclusions about what materials were processed, we can begin with the analysis of the bone and antler tools, describing first the basic activities necessary to make a final product. Based on this approach, we can offer the conclusion that a specific set of flint tools appears to be used for the manufacture of certain categories of bone and antler tools.

Mots-Clés: Late Mesolithic, bone and antler tools, microwear analysis, identification of function

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The Late Palaeolithic and Early Holocene osseous hunting equipment from Poland in the light of traceological studies

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Hunting was one of the basic subsistence strategies in Late Pleistocene and Early Holocene Europe. The Palaeolithic and Mesolithic hunters developed many types of tools and methods that enabled them to effectively acquire the game. An important element of prehistoric hunting kit were products made of osseous raw materials. The main objective of our study is to present results of traceological analyses concerning Late Palaeolithic and early Holocene osseous artefacts usually associated with hunting found in Polish Lowland. Examined prehistoric material for most consist of so-called stray finds and represent various forms of harpoon heads, points and fish hooks. During the traceological, analysis of the included artefacts, a wide spectrum of technological traces was identified that allowed to reconstruct *chaîne opératoire* of their production process. Furthermore, the technological analysis of the harpoon heads showed differences in the techniques used, particularly in the way that barbs and bases were formed, which was a starting point for the discussion about diversification in terms of cultural and chronological affiliation of these artefacts. Moreover, traceological analysis enabled the identification on selected finds specific traces that were possibly not purely practical but served a symbolic purpose. Finally, the results of the studies made it possible to identify in analysed collections elements of transmission of different crafting traditions. For the project, we gathered also morphological, technological and functional data about similar finds from Europe and discussed them with our results. The project is financed by the National Science Centre, Poland (project no. 2019/32/C/HS3/00615).

Mots-Clés: bone, projectile weapon, Poland, traceology, Palaeolithic, Mesolithic

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Hunted or perhaps something completely else? About the „after-impact" holes visible in the prehistoric scapula bones.

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Animal scapulae bearing distinct holes (in some cases even more than one or two) come from several European prehistoric sites, mainly associated with the hunter-gatherer-fisher communities. The genesis of holes is usually interpreted unambiguously, i.e. it is associated with hunting and hitting the scapula with a point or harpoon. Artefacts of this type come also from the Subneolithic sites in Šventoji (coastal Lithuania). The presentation will discuss the results of the traceological studies they were subjected to, as well as the results of the experimental program implemented for their needs. The classification of impact traces creating on bones after hitting with various types of both bone and flint points will be presented. An alternative hypothesis for the genesis of holes visible on the Šventoji scapulae will be discussed.

Mots-Clés: bone, traceology, hunting, use, wear, Šventoji

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Technological use of Sus scrofa canines in the Prehistory of Romania: archaeological and experimental data

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This presentation proposes to draw a picture of the *Sus scrofa* teeth technological exploitation during the Prehistory north of the Danube. Through examining four variables: raw material procurement, blank production, object manufacture and equipment maintenance and, also, comparing the discoveries from prehistoric sites in Romania, we aim to identify the impact of such tools in the economy of prehistoric communities and whether there were variations in the number/ways of use during the Prehistory. The analyzed tools illustrates different degrees of use-wear as well as systematic re-shapening of the active front. In addition, the finished tools are predominant in relation to the sub-products of the *chaîne opératoire*. The fact that the blanks are quasi-absents, means that there was no stock of blanks to be processed when needed. The tooth was probably completely transformed to the finished object after extraction from the mandible. Starting from the data identified at the level of the archaeological pieces, we made replicas, which to allow us a vision over all the variables involved in these techniques of processing osseous materials. In a second stage, the pieces were used in various activities. Comparing the experimental items with the archeological ones, we were able to establish the validity of the hypotheses regarding the way of technological transformation of the teeth, as well as the use of these pieces, most likely for wood processing.
Acknowledgments: The work presented here was supported by a grant from the Romanian Ministry of Research and Innovation, CNCS-UEFISCDI (project number PN-III-P2-2.1-PED-2019-1279 within PNCDI III) and with financial support from the Recurring Donors Fund of the Romanian Academy managed by the Patrimoniu Foundation (project no. GAR-UM-2019-II-2.1-1/15.10.2019).

Mots-Clés: Prehistory, Romania, Sus scrofa, canines, technological and traceological analysis, experimental replicas.

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Use-wear analysis applied to an assemblage from a dissected palimpsest at the Middle Palaeolithic site of El Salt (eastern Iberia)

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We present the results of the functional analysis carried out on the lithic assemblages corresponding to several occupation episodes identified in stratigraphic unit Xa of El Salt (Alcoi, Spain). We aim to contribute to the characterisation of the site Neanderthal occupation episodes, which are based on the activities recognised within these high-temporal resolution analytical frameworks. Two kinds of lithic elements have been studied: one comprising products knapped and used in site, and other consisting of single tools, previously configured and introduced in the site by human groups. The functional pattern represented by each of these assemblages is described: variety of activities and low intensity of use in the first case, and a higher degree of wear in the second one. Significance in terms of human behaviour, occupation dynamics and Neanderthal group mobility in the Alcoi valleys is pondered.

Mots-Clés: El Salt, Middle Palaeolithic, Use wear analysis, used in site, transported tools.

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The Earliest Upper Palaeolithic Personal Ornaments of Altai: technological and functional variability

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Personal ornaments made of organic and mineral raw materials are the most common and characteristic manifestations of ancient symbolism observed in the Upper Palaeolithic assemblages from North and Central Asia. The first symbolic behaviour found across this broad territory comes from the Initial and Early Upper Paleolithic assemblages of Altai Mountains dated 50.0–30.0 ka cal BP. The early use of beads, pendants and other items of personal adornment, marked for this territory, are often considered in discussions about the genesis of ancient symbolism and modern human behaviour. Here we present new data from detailed comparative analyses of personal ornaments from the earliest Upper Palaeolithic assemblages of Denisova cave, Ust-Karakol-1, Anuy-2 and Kara-Bom sites. Our research focused on the production sequences and functions of artefacts following technological, use-wear, experimental and petrography analysis.
The production of Upper Palaeolithic personal ornaments was based on a variety of local and imported raw materials: mammoth ivory, teeth from herbivorous and carnivorous mammals, tubular bones from small mammals and birds, eggshell, freshwater mollusc shells, and soft stones including serpentine, agalmatolite, marble and talc. The consistent selection of particular raw materials to produce certain recurrent types of ornaments suggests that the earliest Upper Palaeolithic inhabitants of Altai had stable preferences and an existing tradition of ornament usage.

Our research shows that the earliest personal ornaments of Altai involved several different production sequences. The production of adornments included selecting and transportation of raw materials, the receipt of blanks, processing by planing, scraping or grinding, drilling a hole or cutting a ring cut for hanging, ornamentation, and polishing. The treatment of mammoth ivory included the most extended and strictly successive operations. The operating sequence of producing the beads, plaques, and diadems consists of removing the cement cover, soaking, then excising the elongated blanks, and planing the blank plates, making a large perforation excising a deep groove on opposite faces then drilling from both sides.

Functional analysis shows that the collection of earliest Upper Palaeolithic ornaments from Altai has several types of use-wear traces resulting from contact with threads and straps, clothes or human skin. The pendants made of the animal teeth and soft stones, the elongated bone beads, and the flat eggshell, ivory and bone beads show characteristic wear patterns resulting from suspension. The ivory plaques, some stone pendants, some of the eggshell and soft stone beads had

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the utilization traces observed testify to the attrition of the surface by the thread fastening the artefact to clothing. The bracelets, diadems and rings, display similar sets of use-wear traces, including smoothing and polishing due to contact with soft organic material and scratches and micro-gouges resulting from casual contacts with other objects.
This research was funded by the Russian Science Foundation project No 20-78-10125 "The dynamics of cultural development and human colonization of Altai at the onset of the Upper Paleolithic: life support strategies, paleotechnologies, mobility".

Mots-Clés: Altai Mountains, Initial Upper Palaeolithic, Early Upper Palaeolithic, Personal ornaments, Technological analysis, Use, wear analysis.

Functional analysis of Middle Palaolithic flint points and other lithic pointed tools from Abric del Pastor (Alcoi, Alicante)

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Discussion about use of lithic projectiles for hunting during the Middle Palaeolithic (Shea, 2006; Villa & Lenoir, 2009; Plisson & Beyries, 1988; Plisson & Roots, 2014; Rios, 2012) is still open. The identification of macroscopic and microscopic diagnostic impact features; such as fractures, linear polishes at the apex, and preparation for hafting at the proximal end, confirm this hypothesis. However, not all pointed lithic artifacts have the same support and tip morphology. An ensemble of 65 pointed stone pieces of different thickness, retouching and preparation of the support have been recovered from *Abric del Pastor*. A previous study (Galván, Hernández and Francisco, 2007) identified several macroscopic impact traces on some of them. The *Abric del Pastor* is a small shelter located about 800 meters above sea level, on the right bank of the *Barranc del Cinc (Alcoy)*. Last neanderthal groups have occupied that shelter and the *El Salt* site. However, we find in *Abric del Pastor* a higher concentration of lithic elements, that could be related to hunting activity than in the other settlement.

We present here a sample of 34 pieces of pointed morphology, selected for their potentialities for the use as hunting weapon.

These elements have been grouped by dimensions and morphology into 4 groups.

- Group 1: is defined by a support elongation index (Width / Length in mm) between 0.30 and 0.43, thickness between 7 and 8 mm and lengths between 43 and 56 mm. These are retouched pieces with frequently abrupt lateral retouches and edges that tend to be curved in shape. All of them have a slightly curved support cross-section.

- Group 2: artifacts are characterized by their short and wide triangular shape (between 25 and 40mm). The elongation index is between 0.60 and 0.95. The supports are thin in the area of the tip, and show sharp edges, some without retouching, and others with simple and flat retouches. None of them, have abrupt retouches.

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- Group 3: pointed and elongated pieces (elongation index between 0.40 and 0.56), thin sub-triangular and straight in section supports. The retouches on the lateral edges are simple.

- Group 4: two small pieces, 24 and 25 mm long, showing triangular and thin morphology; between 3 and 5mm and an elongation index next to 1.

The results of the use-wear analysis demonstrate a relationship between morphology and the use as a projectile. In this sense, the pieces in groups 2 and 3 are those showing diagnostic impact traces of use, which can be related to their use as a spearhead or a pike.
Although the relationship between morphology and function is not decisive, the traces of use report the existence of an intentionality in the selection and preparation of the spear points

Mots-Clés: Use, wear analysis, Middle palaeolithic, lithic technology, hunting weapons

Controlled experiments as a mean for understanding butchering processes in the Palaeolithic: experimental use-wear on non-flint tools at Pinilla del Valle (Madrid, Spain).

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Experimentation as a basic scientific approach is present from the very conception of the traceological method and, in Archaeology, it is frequently used for the purpose, among others, of 'replicate past phenomena' (Mathieu (2002: 1). Considering that an experimentation must take into account aspects as clear objectives and starting hypotheses (i.e. Marreiros et al 2020), we present the results of a controlled multifaceted experimental program that has been designed and adapted to the particular features of the archaeological record documented in the Mousterian sites of Pinilla del Valle in the Upper Lozoya Valley, a central mountainous region of the Iberian Peninsula. The Calvero de la Higuera constitutes a unique enclave to understand different occupation models by groups of hominins and carnivores that populated this area during the Upper Pleistocene (Baquedano et al 2012, 2014).

Butchering processes are well documented both by taphonomic (i.e. Huguet et al 2010) and traceological evidences (Márquez et al 2016) in some of the sites. In order to understand the phases and difficulties of this complex activity, 4 bull heads (Bos primigenius taurus) were processing by experienced individuals using flakes of similar formats to those located in the archaeological deposits.

Local raw materials as quartz, quartzite and porphyry were collected at a maximum distance from Calvero de la Higuera of 7 km in a straight line. All of them are present in the archaeological sites to a greater or lesser extent; being quartz the predominant one in all of them and the most frequent knapping material in the vicinity (Márquez et al 2013; Abrunhosa et al 2017). In this

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way, 52 simple flakes of quartz (n=36), quartzite (n=9) and green porphyry (n=7) were used. Simple flakes are the most frequent elements in the deposits (Márquez et al 2013) and in order to control as much as possible the formation of flaking due to use, the items were not retouched. On the other hand, several quartz, gneiss and green porphyry pebbles were selected to work as hammerstones. All of them present different formats providing the best possible handling to the experimenter according to the task. As anvils, 2 blocks with tabular format were chosen, one made of gneiss and the other of pink porphyry. Both raw materials are also common in the Pinilla del Valle deposits.
The obtained experimental data on use-wear are now presented, yet to be compared in the future with those observed on archaeological tools from the archaeological sites of Pinilla del Valle.

Mots-Clés: Experimental archaeology, Use, wear analysis, Butchering, Non, flint tools, Mousterian, Homo neanderthalensis

What does the functional study of the lithic artefacts of a kill-butchery site tell us? A case study from the Gran Dolina TD10.2 subunit (Atapuerca, Spain)

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Gran Dolina is one of the many karstic formations of the Sierra de Atapuerca located in Northern Spain. It has a long stratigraphic sequence composed of 11 lithostratigraphic units. Unit TD10 with its four sub-units (TD10.1-TD10.4) comprises the youngest evidence of human occupation covering a period from MIS11 to MIS 9.
TD10.2 is one of the richest subunits of the Gran Dolina site and has provided nearly 64,000 faunal and 12,000 lithic remains. The faunal assemblage is dominated by bison bones, for which the main accumulation is known as the bison bone bed. The zooarchaeological and taphonomic analysis of this assemblage revealed that the cave was used as a kill-butchery site and that this was the scenario of the first evidence of mass communal hunting practised by the pre-Neanderthal groups occupying the cavity (Rodríguez-Hidalgo et al. 2017). The ongoing study of the lithic assemblage indicates almost exclusive use of the local chert (Neogene and Cretaceous) in the lithic production with scarce presence also of quartzite, quartz, sandstone and limestone. This extreme predominance of local chert has not been seen at any other level or site in Sierra de Atapuerca. The assemblage is composed mainly of flake products with high diversity of small flake tools and limited presence of large cutting tools. The refit connections indicate in-situ knapping activities focused mainly on flake production, and shaping and reshaping activities.
This study aims to present, for the first time, the functional analysis results of the TD10.2 lithic assemblage, which will complete and enrich the interpretations and discussion on the hominin high behavioural capacity and social complexity provided by the studies of the faunal and lithic assemblage of this subunit. The microwear study of
this assemblage is not an easy task given the poor preservation of the main raw material (i.e. chert). Indeed, these first results concern mainly to the artefacts made of Cretaceous chert, as they are fairly better preserved than the dominant Neogene variety. The selected pieces (retouched and unretouched flakes) were first screened by means of a low-power approach. After

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the screening, the best preserved pieces were chosen for detailed high-power approach microscopic analysis. Optical, 3D digital and scanning electron microscopes were jointly used for study and characterisation of use-wear traces. To reinforce interpretation of the archaeological traces, different experiments (i.e. butchery, hide, wood and bone working) were undertaken with both Atapuerca chert varieties. The study results show limited, but actual good preservation of use-wear traces in certain cases. Features related to longitudinal and transversal motions and working of soft and hard materials were identified. Based on this, mainly butchery-related activities were interpreted, although some bone, wood and hide working activities were evident too.

Mots-Clés: Middle Pleistocene, Gran Dolina TD10.2, kill, butchery site, use, wear traces

Technological innovations and functional diversity in North and Central Sulawesi during the Late Pleistocene and Holocene

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Recent excavations in Central and Northern Sulawesi produced an archaeological sequence from the late Pleistocene and Holocene. The sites of Topogaro on the eastern coast of Central Sulawesi, and Leang Sarru, located in the Talaud Islands in North Sulawesi, yielded numerous osseous and lithic artefacts in association with anatomically modern humans (AMH) that arrived in this region by 30,000 BP, if not considerably earlier. Sulawesi is the largest island in Wallacea and located along the early AMH migration routes to Sahul and Near Oceania that required open sea crossings between the past continents of Sunda and Sahul. An experimental use-wear study was conducted on lithic and bone artefacts from Topogaro and Leang Sarru. The utilization of a variety of technologies based on organic and inorganic materials, which on the one hand is dominated by the use of simple unmodified flakes, but on the other hand also produced carefully crafted bone tools, can already be observed during the early stage of the expansion and dispersal of modern humans across South and East Asia, Island Southeast Asia (ISEA), and Sahul. While bone-based technologies had a more intensive use and wider appearance after the end of the Pleistocene in ISEA and Sulawesi. This paper presents the results of our study in context with the ongoing use-wear studies in the region.
Traceological analyses can contribute to the understanding that those early seafarers possessed a wide range of technologies and complex behavioural strategies that enabled them to successfully navigate and colonize remote islands and coastal region at the time of their arrival in the Wallacean region. The variability in the use of bone, plant and lithic technologies also demonstrates the capacity of those early islanders for flexible responses to changing island and rainforest environments during the transition from the late Pleistocene to the Holocene and to adapt their subsistence strategies to the given conditions.

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Mots-Clés: Use, wear analysis, Prehistoric Technologies, AMH, Maritime Interaction, Wallacea

Experiments across disciplines: unfolding starchy plants processing with pebble tools during the EUP in the Eurasian Steppe.

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Starch grains represent the most direct evidence for dietary carbohydrates use, yet they remain undervalued for reconstructing food strategies before crops domestication. Artefacts intentionally used to transform starchy plants into calorific food are scattered and precious. The residues of soft plants starch-rich storage organs (PSRSO) – transformed into flour – still adhering to the utilized areas of ground stones used by early Homo sapiens during Eurasia colonization more than 40 ka BP, are even more rare are. The proposed contribution refers to the combined analysis of both starch grains processed by grinding stones and those prepared in the lab to build reference collections for plant processing during early Upper Palaeolithic. The archaeological test cases were based on pebbles tools retrieved in several EUP sites across the Eurasian Steppe dating 38-25 ka cal BP. The experiments were devoted to address different questions although all revolved around the main research question: what plants were processed with pebble stones and what for. In second instance, the experiments aimed at reproducing – under controlled conditions – the transformation occurring to both starch grains and to the surfaces of the pebble stones. Our risk-hypothesis is that crevices – on the rocks uneven surfaces – may have served as traps for the starches resulting from the artefact used for intentional grinding. It is also necessary to have a reference record to compare the data obtained for the characterization of starch grains from archaeological samples, since many of the plants in use during the period under investigation are not acknowledged among those of economic interest nowadays. The plants used for the experiments were selected among those with starchy organs – USOs (roots and tubers) and ASOs (seeds and shelled fruits) available across the Eurasian Steppe around 40 ka BP on the base of the literary review. These starch-rich organs were processed according to a devoted procedure in order to extract the starch grains to be characterized for their morphology (VLM and SEM) and for their content in fatty acids (GC-MS) to provide proxies at both morphological and physical-chemical level to identify plants with putative nutritional value available during MIS 3. The experiment design includes: 1) the pre-treatment of the stones used to process

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the targeted plants in order to breakdown any biogenic charge on the stone surface by means of different chemicals (solution of water and HCl, H2O2, NaClO) and through sonication; 2) samples from each stage were taken verify the resistance of putative biogenic contaminants; 3) at given time (from T0, not used, to T1, T2, T3, etc.) each step of the grinding was recorded through molding and residues removal. Different microscopies have been applied to identify: (i) raw materials (thin sections and metallographic microscope) for the selection of stones that mimicked the roughness of the archaeological tools, (ii) wear-traces obtained following a very strict utilization schedule on selected plants (by comparing OM, 3DM, and SEM), and (iii) starch grains (OM, SEM).

Mots-Clés: EUP Non, flaked industry, starchy, plants transformation, starch, experimental archaeology

Use of bone and antler as raw material during the chalcolithic in Northeastern Bulgaria (based on the materials from tell Polyanitsa)

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During the Chalcolithic in many cultures of the Balkan-Danube region intensive use of antler, bones of wild and domestic animals, as well as shells and wild boar's tusks were detected. Using of these raw materials and a well-developed technology, various tools, household and cult objects, and jewelry was made. A rich assemblage, numbering 266 objects in accordance with the field inventory, of similar products was collected during the archaeological excavations of tell Polyanitsa, located in Northeastern Bulgaria. The settlement existed from the beginning of the Early Chalcolithic to the end of the Middle Chalcolithic. The aim of this paper is to introduce into scientific circulation these less known materials and to present the results of technical-morphological and experimental and traceological analysis.

Studies of the Chalcolithic materials of the Balkan-Danube region very rarely include special analysis of antler and bone products, tusks, shells, while numerous finds of this time testify to the intensive use of this raw material in many places. The considered collection is the biggest for Chalcolithic settlements in Northeastern Bulgaria, and most of the items were subjected to technical-morphological and experimental and traceological analysis.

The abundance and diversity of the examined objects from antler, bone, shells, and tusks testifies to the widespread use of these types of raw materials in the Polyanitsa settlement. Many products and methods of their manufacture have analogies in the materials of other settlements in Northeastern Bulgaria: hoes, diggers, axe-shaped, adze-shaped tools, couplings, awls, daggers in the Golyamo Delchevo and Durankulak tells, bracelets made of spondylus shells in the Varna and Durankulak necropolises, beads in the Radingrad and Ovcharovo tells.

The traceological analysis of the collection showed that the bone and antler tools were used in agriculture, processing of flint, wood, hides and leather, and ceramics. It should be noted that among the flint inventory of the settlement, various tools were found that served for processing bone / antler raw materials. Among them are planing knives, scrapers, saws, drills, burins. These facts, as well as the finds of semi-finished and unfinished bone / antler products, indicate the existence of local production. The quality of processing and the rich assortment of products are proof of the high level of development of the bone-processing industry and the demand for itsproducts in the economic and household activities of the population of the Chalcolithic sites of Northeastern Bulgaria.

These results may serve as a basis for further comparative studies of the Neolithic and Chalcolithic bone industries from Bulgaria and Romania.

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Mots-Clés: Chalcolithic time, Northeastern Bulgaria, bone and antler artifacts, experimental and traceological analysis

Functional analysis of a singular Bell-beaker tomb: the "prince" of Fuente Olmedo (Valladolid, Spain).

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The burial of a young man with a magnificent gravegoods has been known since the 70s of the s. XX. The tomb was found during actual farming works and has no other archaeological context in its proximity. The atonishing gravegoods are integrated by a gold ribbon, a tanged dagger, 11 Palmela points, an archer's wrist-guard, 1 flint arrowhead and 3 vessels with the characteristic ceramic decoration of the Ciemplozuelos campaniforme style. This is one of the European Bell-beaker tombs with the highest concentration of metallic elements in a single individual. This work presents the traceological study of the set of ornaments and weapons, and provides a new vision of the different studies carried out on this unique set.

Mots-Clés: Functional analysis, Bell, beaker tomb, Fuente Olmedo (Valladolid, Spain).

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Current research on the function of Homo antecessor's stone tool assemblage (Gran Dolina- TD6, Atapuerca, Spain). A new insight from a multi-technique approach

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Excavations carried out during the recent years at Gran Dolina site (Sierra de Atapuerca, Burgos, Spain) considerably increased the stone tool assemblage retrieved from Unit TD6 (Mosquera et al. 2018). Dated to 0.9 Ma, the excavation of TD6 have provided with detailed and fresh data of a unique and well-preserved Early Pleistocene home base, key to shed light on the behaviour of the first European populations (Saladié et al. 2021) and their lithic technology.
In this talk, we present an ongoing investigation about the functionality of the Homo antecessor's toolkit which involves, for the first time, an integrative study of two technological categories. On one hand, we have studied the non-flaked assemblage, that includes a large group of quartzite and sandstone cobbles and pebbles transported by hominins to the cave. Our analysis has focused on the identification of the percussive traces that could revealed the activities beyond stone flaking performed at TD6. On the other, we revised the flaked assemblage (including flake and retouched artefacts). After an initial assessment of the latter, our analysis has prioritised the study of quartzite and quartz flaked tools from the new collections that showed a better preservation for functional analysis. Methodologically, the microscopic analysis was carried out applying a multi-technique approach encompassing Optical, 3D Digital and Scanning Electron Microscopy, and Energy-dispersive X-ray spectroscopy for a basic elementary characterisation.
Results obtained in this new study, coupled with preliminary data and new experiments currently undertaken, will enable to expand our knowledge on the variety of subsistence activities carried out in the TD6 hominin occupation. Our work will additionally allow to update hypotheses pointed in previous studies (Carbonell et al. 1999), in which butchery activities were considered predominant. New data inform about an intense tool usage and widen the type of activities recognised, including transversal actions on a variety of materials, and reveal that pounding activities had also a significant role within the daily life behavioural activities of H. antecessor.

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Mots-Clés: Early Pleistocene, Gran Dolina, TD6, use, wear analysis, home base, Homo antecessor

Traceological study of the concentration of superblades from the Kamenevo burial ground (Bulgaria)

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Superblades and the peculiarities of their production in the Eneolithic of Bulgaria have been the subject of numerous and diverse studies. Among them are special works on determining the physical qualities of flint raw materials, the deposits of which are located in in north-eastern Bulgaria; describing the methods of its extraction and subsequent knapping with the help of special devices, which made it possible to obtain high-quality blanks for tools; characterizing their production efficiency and ways of use. The territory of distribution of these items includes sites of Bulgaria, Romania, southwestern regions of Moldova and Ukraine. At a number of archaeological sites in this vast region, there are concentrations of such blades in the form of compact clusters. Such artefacts found in the materials of settlements, as a rule, are interpreted by researchers as blanks of tools (Gurova et al. 2016), preserved for future use and not having traces of use, and their finds outside the settlements and outside the cultural layer are considered hoards, possibly, of a votive nature. In this regard, the results of traceological studies of the concentration of superblades found on the territory of the Kamenevo burial ground in northeastern Bulgaria are of interest. This burial ground is located in the area of Dobrudzhian flint mining and processing in the workshops of the eponymous settlement of Kamenevo. The cluster consisted of 23 blades, 118-180 mm long, 15-28 mm wide. Judging by the size and shape, the blades were obtained with the help of an intermediate tool, some of them were from the same core. Triangular or trapezoidal in cross-section products have a slightly curved profile and trapezoidal or ellipsoidal faceted striking platforms. Traceological analysis made it possible to identify among the examined blades tools for cutting grass and meat. In addition, traces typical of tools used with handles of soft material were found on the back parts of some of them.

Thus, the concentration of flint artefacts found on the territory of the Kamenevo burial ground represents a unified type of superblades characteristic of the Bulgarian Eneolithic. Judging by their compact arrangement, they were all tied together or were in a bag, some of them were used as

tools, as indicated by use-wear traces. This fact forces us to reconsider the well-established idea

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that all such concentrations of blades represent unused blanks, which allows us to speak of the need for traceological analysis of such finds.

Mots-Clés: Bulgaria, Eneolithic, superblades, burial ground, traceological study

Stone tools from burial complexes of Ekven burial ground (Chukotka, Russia) in the light of traceological analysis

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Elucidation of the functions of ancient tools and methods of using household and votive objects is most promising when applying traceological analysis in close combination with experimental and ethnographic data. At the same time, in addition to a thorough microscopic analysis, it is necessary to correctly observe the procedure for experimental work, as well as to select ethnographic information that is closest to the ancient artefacts under study.
The numerous grave goods from the Ekven burial ground located in the north of the Chukotka Peninsula (1 millennium BC) include knives of a crescent and elongated shape made of slate rocks. Such tools are known in the inventory of the indigenous peoples of the Bering Sea under the names "pekul" among the Chukchi and "ulu" among the Eskimos. Ethnographic data indicate that "women's knives" were used in various operations for processing hides, "men's knives" – for skinning animal carcasses. The conducted traceological analysis of archaeological artefacts showed well-pronounced use-wear traces on surfaces of most of the tools. Among them are knives for cutting meat, tools for scraping and cutting skins. Combined tools were found, different parts of which were used in different operations. For example, part of a blade of one of the knives was used for scraping skin, while the other was used as a knife. In addition to use-wear features, technological traces have been preserved on the surfaces of the knives, which helped to understand the methods of their manufacture. Experiments made it possible to characterize all stages of this process: selection of raw materials for its primary processing, shaping, abrasive surface treatment, blade sharpening, fixation in a bone handle with glue. Experimental tools have proven to be effective in the work.
Thus, the studies carried out have shown that the knives from the Ekven burial ground have intensive use-wear traces, which indicates their application in everyday life. The functional features of each tool were determined, and the reconstruction of the process of their manufacture brought new information, insufficiently characterized in ethnographic sources.

Mots-Clés: Chukotka, Ekven burial ground (1 millennium BC), stone knives, experimental and traceological analysis

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Use-wear traces on Mesolithic composite bone arrowheads from the Volga-Oka interfluve, Russia

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Excavations of multilayer peat bog sites conducted by the author during 1989-2002 in the Volga-Oka interfluve in the center of European Russia yielded a number of slotted bone arrowheads dated from the very beginning of the Mesolithic to the Early Neolithic. Some of them preserved flint inserts in their slots, fixed with the help of a dark glue. Traceological analysis of these artefacts conducted by the author revealed various traces of their manufacture and use. The latter include blunting and rounding of the tip of the bone point, accompanied by polishing and linear traces, when an arrowhead hit some soft material. The shape and orientation of linear traces make possible to see if the arrow was rotating when hitting the target or not. Damage scars, severe smashing and splitting of the point indicate hitting hard material. Specific use-wear traces on points of arrowheads similar to ones observed on digging tools indicate hitting the ground, probably when the arrow missed the hunted mammal.

Use-wear traces observed on flint inserts preserved in situ in slots of arrowheads include edge damage in the shape of microchipping or breaking off segments of the edge, sometimes accompanied by a thin streak of polishing along the edge and scarce or single linear traces. The latter consist of thin strips of interrupted bright polishing sometimes accompanied by scarce thin scratches running subparallel to the insert edge or at an acute angle to it. Abrasion of the edge observed on inserts of some arrowheads could be a result of attrition inside a quiver or of a secondary use of an arrowhead.

Use-wear traces are rather poorly developed on most studied arrowheads indicating a short lifetime of an arrowhead. However, some bone slotted arrowheads yielded very well pronounced use-wear traces pointing at a long use of such arrowheads. Some of the latter show traces of repair after breakage, mostly reshaping of the point. Their owners treated these arrowheads with special care.

Inserts were fixed in slots with the help of glue made of birch bark tar with an admixture of charcoal dust. First, the tar was put in the slot, after it, inserts already arranged in a line were placed into the slot and extra glue was removed. Similar glue on bevels of bone arrowheads indicate hafting in a split shaft or into a conical nest drilled at the end of an arrow shaft.

Mots-Clés: Mesolithic, Russia, composite bone arrowheads: use, wear analysis

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Tools for grinding plants from the Upper Palaeolithic sites of Kostenki and Suren: an experimental study of the appearance and characteristics of use-wear traces on grinding stones

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Traceological study of the Stone Age tools, which served for processing vegetation, has been going on for more than 30 years. However, due to the insufficiency of the available experimental base, many questions of the traceological determination of the Palaeolithic unmodified grinding stones still remain unresolved. These problems stimulated a series of our experimental works. The tasks were as follows: 1. to reveal a set of use-wear traces which are characteristic of tools for processing different types of plant raw materials. 2. to create a reference collection of grinding stones from different types of rock with a detailed description of the experiments, photographic recording of the workflow, as well as microphotography of traces at different stages of the work.At the initial stage, our experiments were associated with a species of vegetation quite widespread in Eurasia in the Palaeolithic time – cattail (Týpha). Artefacts from the Suren grotto and from the Kostenki 14 site served as samples for the creation of experimental tools.For replica tools, sandstone tiles with a flat surface (lower passive stones) and upper (active) planoconvex pebbles were chosen. Before starting the experiments, the cattail was dried and peeled. The work was carried out in a circular and reciprocating motion with strong pressure on the processed material. After five hours of work, very distinct traces appeared on the tools: glossy spots of varying intensity with uneven boundaries, light grinding of protruding areas, crushed mineral granules

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on the working zones of the lower stones and rare thin shallow linear traces. Traces of abrasive contact between the lower and upper stones sometimes are poorly expressed, since there was a layer of vegetation between an active and a passive tool. Direct contact between the lower and upper stones occurred only when the upper tool slid to the periphery of the working part of the lower stone, or the plant material was wiped through allowing a pestle to be in contact with the lower stone.The results of the experimental work revealed stable use-wear traces, characteristic of the processing of cattail, which confirmed the preliminary data of the traceological analysis of the original tools. In the future, it is planned to continue experiments on processing different types of plant materials using tools from different types of stone. The data obtained will form the database required for further detailed.

Mots-Clés: Tools: grinding plants, the Upper Palaeolithic sites, Kostenki, Suren, use, wear traces, grinding stones

S6-D: Chronologie des sites préhistoriques du Proche et Moyen Orient au Pléistocène moyen et supérieur : un passage terrestre unique entre Afrique et Eurasie.

U-Series isotope imaging using FsLA-ICP-MS: New chronological data for Levantine Middle Pleistocene sites using snail shells, ostrich eggshells and teeth.

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Les datations par les séries de l'uranium, très largement utilisées en géologie, le sont de manière beaucoup plus limitée en archéologie, et ce malgré les grandes quantités d'échantillons carbonatés présents parmi les vestiges archéologiques (coquilles, biominéraux, hydroxyapatite, carbonates, etc). L'invasivité du protocole chimique habituellement utilisé, mais aussi ses limites face à des échantillons très pollués et contenants de très faibles teneurs en uranium et thorium (sub ppb) en font souvent une méthode moins plébiscitée, par opposition aux méthodes paléo-dosimétriques très largement appliquées à la datation de gisements du Pléistocène moyen et supérieur.

Afin de dépasser ces limites, nous avons récemment mis en place un nouveau protocole de datation par les séries de l'uranium fondé sur l'imagerie LA-ICP-MS, permettant de se dispenser de toute phase de préparation chimique et donc de restreindre les risques de contamination de l'échantillon. Le couplage de l'ablation laser femtoseconde à un ICPMS haute résolution nous permet de cartographier la répartition de plusieurs radioéléments, dont le 230Th, à des niveaux de concentration de l'ordre de l'ultra-trace (dizaine de ppt, voire moins). Le traitement des images résultantes offre la possibilité de sélectionner à une échelle inédite (quelques μm) les zones

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adaptées à la datation U-Th. Ainsi, les phénomènes d'incorporation et de lessivage de certains isotopes sont mieux cernés et pris en compte, permettant une datation directe de ces matériaux via l'imagerie.

Ce protocole a été appliqué à de nombreux échantillons issus de sites clés du Proche-Orient (Skhul, Misliya, Nesher Ramla) et sur divers types de matériaux : coquilles d'oeufs d'autruches, coquilles d'escargots, dents et planchers stalagmitiques. Les résultats confortent et complètent les chronologies pré-établies dans cette région pour le Pléistocène moyen et supérieur.

Mots-Clés: U, Series isotope, FsLA, ICP, MS, New chronological data, Middle Pleistocene

Chronology of the Lower to Middle Paleolithic transition at Tabun Cave (Israel) using IRSL (pIRIR290) dating

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Tabun Cave, located in Mount Carmel, Israel, is one of the most famous sites in the Levant. Its exceptional sequence spans the Lower and late Middle Palaeolithic and the industries found at the site became a reference for the Palaeolithic of the Levant. Human remains associated with the Levallois technology were found in the Middle Palaeolithic layers, including a Neanderthal skeleton (C1), and a mandible (C2) whose attribution is still debated.
Electron spin resonance (ESR) of tooth enamel and thermoluminescence (TL) of burnt flint were applied to establish the chronology of the sequence. However, the sedimentary matrix has never been dated. We present here the first dates obtained using infrared stimulated luminescence (IRSL) of feldspar with the pIRIR290 protocol, whose main advantage is that fading may be negligible. Samples were retrieved from the section exposed by Jelinek's excavation and include Units I of the Middle Paleolithic, Units II-IX of the early Middle Paleolithic and Unit X of the Lower to the Middle Paleolithic transition.

Our new age results indicate that the sediments throughout the investigated portion of the section were deposited between 280 ± 33 ka (Unit X, layer 72) and 146 ± 11 ka (Unit I, layer 20). The age obtained for Unit X, documenting the transition between the Acheuleo-Yabroudian and the Acheulean, and where the Levallois core technology is first documented in the sequence, is ca. 280 ka. The early Middle Palaeolithic layer starts at ca. 246 ka, indicating that the Lower to Middle Paleolithic transition occurred during Marine Isotope Stages 8 and 7, in agreement with TL data.

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Mots-Clés: Chronology, Lower Paleolithic, Middle Paleolithic, Tabun Cave

ESR/U-SERIES DATING OF THE PALAEOANTHROPOLOGICAL SITE OF QALEH KURD, IRAN - PRELIMINARY RESULTS

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Recent excavations organized at Qaleh Kurd Cave (Qazvin Province, Iran) in the frame of the joint French and Iranian Palaeoanthropological Project (FIPP) have provided the discovery of one in situ human decidual tooth associated with Mousterian-like archaeological artefacts and paleontological remains with evidence of human butchery in a 3m thick stratigraphic sequence subdivided in two sedimentary sub-sequences. The upper sub-sequence 1 corresponds to Holocene deposits as demonstrated by radiocarbon dates ranging between 1,390 BP and 520 BP while the underlying sub-sequence 2 was dated by the same method older than 43,500 BP. In order to precise the age of this sub-sequence 2, herbivorous teeth were selected in two excavation trenches

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(Trench 1 and Trench 3) to be analyzed by ESR/U-series method. The preliminary ages obtained range from ca 15O to 450 ka, indicating that the main part of the sub-sequence 2 was deposited during the Middle Pleistocene. New analyses including in situ gamma dosimetry and additional ESR/U-series analyses would be performed in the few next years to confirm the antiquity of the dated levels, placing the site amongst the oldest human evidence in Iran.

Mots-Clés: ESR/U, SERIES, PALAEOANTHROPOLOGICAL SITE, QALEH KURD, IRAN

A multi-proxy approach to date the fossiliferous horizon of the Lower Pleistocene travertine deposit in the Denizli Basin (Kocabas hominin locality), S-W Turkey

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A multi-proxy approach to date the fossiliferous horizon of the Lower Pleistocene travertine deposit in the Denizli Basin (Kocabas hominin locality), S-W Turkey

Mots-Clés: fossiliferous horizon, Lower Pleistocene, travertine deposit, Denizli Basin, Kocabas hominin locality, S, W Turkey

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The MP-UP transition in southern Levant: the pace of the cultural changes and coexistence.

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The transition from the Middle Palaeolithic to the Upper Paleolithic in Eurasia is characterized with demographic changes and cultural transformations corresponding with the recent out-of-Africa of modern humans. Although this phenomenon is well recognized and studied in various regions in Eurasia its timing is not well established thus making it difficult to reconstruct this considerable event.

The current study focuses on the southern Levant which is the initial place where this transition was first noted and defined. Examination of new high resolution of radiocarbon chronology from late Middle Paleolithic and Initial Upper Paleolithic sites in the region suggest the following scenario.

The transition from the Middle to the Upper Paleolithic in the Levant began as early as 50 thousand years ago at the site of Boker Tachtit, Negev Desert. This process transpired while local Neanderthal populations were still inhabiting the region. The transformation to the fully fledged Upper Paleolithic industries occurred in the Negev at 47 thousand from where it spread to other regions in the Levant.

A similar process occurred in other regions in central Europe and northeast Asia a couple of thousands of years later. The timing of these events supports a rapid out-of-Africa dispersal which included populations coexistence along the migrations path.

Mots-Clés: Middle, Upper Palaeolithic, southern Levant, the cultural changes and coexistence.

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The oldest prehistoric sites of Turkey and the expansion of the hominins between Africa, Europe and Asia during Pleistocene.

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At the exit of Africa and at the crossroads between Asia and Europe, Turkey is a privileged zone to follow the animal and human dispersions through time. However few ancient prehistoric sites are known. Among these, Dursunlu has yielded lithic industries that, although not very characteristic, are dated to 1 Ma. At Kaletepe Deresi 3, obsidian assemblages including handaxes have been discovered, their age is currently debated.
In this context, the travertine of the Denizli Basin, whose upper deposits have preserved bones of large mammals as well as other indicators of biodiversity (leaves, crabs...) and a fragmentary skull of *Homo erectus*, corresponds to the only well-documented and dated spot of the whole region for the Early and beginning of Middle Pleistocene.

Indeed, a multidisciplinary work including a biostratigraphic approach, dating by cosmogenic nuclides, by paleomagnetism and by combined ESR/uranium-series, allowed to circumscribe the fossiliferous deposit between 1.6 and 1.2 Ma.

Moreover, an anthropological and cladistic analysis of the *Homo erectus* partial skull has highlighted its proximity to African fossils attributed to this species in the broad sense, notably those around 1 Ma (Daka-Bouri, Buia).

We can therefore suggest a common evolutionary history between these *Homo erectus* in East Africa and in Turkey, different from that of the Dmanisi fossils, dated to 1.8 Ma, who left Africa probably during a previous wave. We will discuss these possibilities by invoking all the proxies: paleogeography, paleoenvironment, fauna, hominins and their behaviors.

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Mots-Clés: oldest prehistoric sites, hominins, Turkey, expansion, Africa, Europe, Asia, Pleistocene.

The Near and Middle East as a unique terrestrial corridor between Africa and Eurasia during the Pleistocene

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The Near and Middle East is a key region to study past human population dynamics and dispersals out of Africa to Eurasia. The issue of the routes to enter Europe is not solved although the main and oldest way to leave Africa was likely the Levantine corridor. It is the only gateway by land that provided an access to Europe by Turkey or by the northern shores of the Black Sea, and to Asia by using the Arabic peninsula as a platform step. The oldest site in Eurasia, Dmanisi, dated to 1.8 Ma, located 2000 km straight to the north in the Caucasus region, at the crossroads of Europe and Asia, was probably reached via this route. Half a million years later, in present-day Israel, the first handaxes appeared at Ubeidyia and the earliest evidence of fire was observed around 0.8 Ma at Gesher Benot Ya'aqov. During all the Pleistocene period, migration waves succeed to other waves resulting at the end of the Middle Pleistocene period in the coexistence of several human species in this area, with distinct cultural behaviors. Dating methods are of paramount importance to constrain the chronological framework in which past humans evolved. Here we present the main sites dated by radiometric methods yielding a contribution in the understanding of human evolution from a chronological point of view.

Mots-Clés: The Near and Middle East, corridor, Africa, Eurasia, Pleistocene

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S7-A: Patterns and causes of spatial and temporal variability during the Middle Paleolithic

Refitting NMO: Ad-hoc Late Middle-Paleolithic knapping in hunting locality and its significance to Middle-Paleolithic lithic variability

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The site of Nahal Mahanayeem Outlet (NMO) is a short-term, task specific hunting locality located on the east bank of the Upper Jordan River. The site is OSL dated to c. 60000 years BP. NMO yielded a uniquely small, yet highly significant, lithic assemblage in mint preservation conditions, dominant by pointed elements and cutting elements. Importantly, few on site reduction sequences could be refitted, allowing us good understanding of the on-site knapping as well as flint economy. The flint assemblage offers rare glimpse into the tool kit and its technological preferences used by the Late Middle-Paleolithic (LMP) hunters in the Levant. Claims for an increase of stone tools technological variability in the Levantine LMP (_~50-70k years ago) are long debated. recent study indicate that such variability can be observed not only within the Levallois method production sequences, but also evident from increase of non-Levallois knapping methods in the LMP assemblages, for example the number of single-platform cores for flake and blade production. The refitted sequences from NMO indicate the application of non-Levallois, ad-hoc knapping methods, aiming to achieve maximum cutting edge length by means of minimum effort. The knapping method applied efficiently to the size and form of the available raw material. The unique flint assemblage of NMO allows us to place the non-Levallois knapping methods in a chrono-cultural context and better understanding of technological flexibility, mobility patterns and raw material procurement and curation by LMP hunters.

Mots-Clés: Middle Paleolithic, Lithic Technology, refitting

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Hunting strategies and territories: Crossed views on the Neanderthals of Southeastern France.

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The Mediterranean region has yielded major archaeo-stratigraphic sequences dated to the Middle Paleolithic, like the complex of Balzi Rossi in Italian Liguria, the Bau de l'Aubesier and the Hortus in Provence and Languedoc, or the Abric Romaní and Covalejos cave in Spanish Catalonia, among others.
Decades of research carried out on several such sites largely improved our knowledge on Pre-Neanderthal and Neanderthal way of life. However, the heterogeneity of the analyses and the lack of resolution of some data do not always help us to clearly identify changes or continuities in the behavior of these populations.

Here we address this issue by studying the hunting and territorial exploitation strategies of human groups who lived in Mediterranean France. Our research focused on two main parameters, the demographic composition of the hunted animal populations and the seasonality of acquisition activities. In this purpose, we propose to combine classical ageing methods (based on tooth eruption and wear) with dental cementum analysis for providing biological age and slaughter season of the main animal preys (red deer, ibex).
We will present the results of analyses we made for five French sites: the Canalettes and the Rescoundudou in Aveyron (OIS 5a and 5c), the rockshelter of Mandrin in Drôme (OIS 4-3), Pié Lombard (late OIS 5) and the Lazaret Cave (OIS 6) in the Alpes Maritimes. In addition to available data from other major archaeological sequences, the precision of the results thus obtained bring important new information able to shed new light on the socio-economic organization and territorial mobility system of these populations.

Mots-Clés: dle Paleolithic, Mediterranean, Subsistence, Settlement patterns, Age, Cementochronology

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Knapping process of bifacial leafpoints and scrapers in the Middle Paleolithic (MIS 5-3) of North-Eastern France. What do we know ?

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The many open-air sites of Middle Paleolithic of Northern and Eastern France are characterized by a majority of flake-based industries, but bifacial elements appear during the Early-Glacial (MIS5) and Middle Plenigacial (MIS 3) stages of the Weichselian, and particularly bifacial leafpoints and bifacial scrapers. Tools of these types are present within sites with low, medium, or large number of artefacts, although they themselves are in small numbers in all occurrences. Thereby we wonder, were they brought on the sites as finished pieces or were they made on the spot ? We use scar-pattern analysis to reconstruct the shaping process of bifacial leafpoints and scrapers. We also question their place regarding the range of knapping behaviors and lithic raw material procurement strategies of Neanderthals on Late Middle Paleolithic open-air sites.

Mots-Clés: Middle Paleolithic, lithic tools, leafpoints, bifacial, technology, Neanderthals, MIS 5, 3

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Linked by the fire: A Middle Palaeolithic hearth-related assemblage from Abric del Pastor Unit IVf (Alcoi, Spain)

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Testing behavioural features of Neanderthal groups requires a high-resolution spatial and temporal approach that helps us get closer to an ethnographic scale and this is hampered by the archaeological palimpsest effect. In this sense, archaeostratigraphic and spatial analyses of the macroscopic archaeological record (i.e. lithic, faunal and combustion remains) has shown to be a useful tool for defining new analytical frameworks that help us to approach the human timescale. A series of Neanderthal short-term occupations have previously been identified at the Abric del Pastor Middle Palaeolithic site (Alcoi, Spain) based on high-resolution archaeostratigraphic data from Units IVa, IVb, IVc and IVd (Machado et al. 2013; 2019; Mallol et al. 2019). Here, we performed archaeostratigraphic, lithic raw material and technological analyses on an *in situ* archaeological combustion area from Unit IVf. Preliminary results show a discrete low-density accumulation of materials around a hearth as a potential human occupation episode. Thus, this is an opportunity to understand the formation processes of archaeological assemblages in a high-resolution way, allowing us to identify behavioural strategies that could go unnoticed in the study of dense palimpsests. These results will be compared to other MIS 4 primary human occupation contexts to explore variability in settlement patterns within this period.

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Mots-Clés: Neanderthal behaviour, Archaeostratigraphy, Raw material, Lithic technology

Deconstructing 'Tabun D' phase: a variable perspective into the Early Middle Paleolithic of Tabun Cave and the southern Levant

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The Levantine Middle Paleolithic (MP) is commonly divided into three phases: early, middle and late, originally structured on Copeland's characterization of the assemblages from layers D, C and B of Garrod's excavations at Tabun Cave, Israel. While variability of the middle and late phases of the Levantine MP has been long discussed (1-2), the early phase – Tabun-D – is still perceived as a relatively homogenous techno-complex. It is conceived as focused on intensive production of blades, most often (though not exclusively) using unidirectional/convergent Levallois technology. Furthermore, sites of this phase are often reconstructed as short-term residential occupation. Although insights into its complexity were already provided by the work of Meignen (3) on different blade technologies and results from Misliya that indicate a high intensity of occupation (4), we are still lacking a perspective into patterns of change throughout this phase.
Preliminary notes on the variable character of 'Tabun-D' were first raised by Jelinek (5), following his excavation at Tabun, revealing it is composed of a long sequence, extending over 3m of sediments, divided into eight units (IX-II) and 43 layers (27-69), dated to 250-190ka (6). Nonetheless, ensuing research has focused on the best preserved Unit IX, while the other units of the early MP were ignored, mainly due to the presence of erosional channels in the upper part of the Tabun-D sequence. In our recent analysis of the Tabun-D assemblages we excluded units III-IV and VI, which are most affected by the erosional channels, but used units IX-VII (layers 69-50), V (layers 41-42) and II (layers 32-27) to examine patterns of change within the early MP. Results demonstrate a decline in the frequency of blades-the hallmark of 'Tabun-D' phase-through time. Fluctuations in frequencies of points and other technological elements, alongside changes in secondary modification, segmentation of reduction sequences and taphonomy of the flint assemblages indicate variation in exploitation of the landscape and the character of occupation at the cave. Micromorphological research completes the picture by tracing variation in the depositional environments. The bundle of evidence is employed to deconstruct the character of the end of the Middle Pleistocene at the cave, which we argue, forms an essential step in our understanding the mosaic character the MP of the Levant and the possible reoccurring waves of dispersal out of Africa.

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Mots-Clés: Middle Paleolithic, Levant, Tabun Cave, diachronic change, mode of occupation

New finds from Hohle Fels Cave in the Swabian Jura call for a reassessment of the cultural chronology of the late Middle Paleolithic in Central Europe

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After several seasons of excavating low-density Middle Paleolithic deposits in Hohle Fels Cave in the Ach Valley of southwestern Germany, in 2020 we reached the comparatively rich archaeological horizons (AH) X and XI over a meter below the base of the site's well-known Aurignacian layers. Four ESR dates from herbivore teeth recovered from the overlying AH IX provide a weighted mean age of 64 ± 4 ka BP. Environmental data from micromammals document that AH X and XI correspond to relatively warm and wet conditions that likely correlate to either interstadial conditions during early MIS 3 or late MIS 5. Initial faunal analysis documents an abundance of cave bears bones from natural deaths, as is typical for the Middle Paleolithic of Hohle Fels, as well as remains of more typical prey species. Additionally, the faunal assemblage includes a retouched bone fragments and numerous pieces of burnt bone. The lithic assemblage from AH X includes a complete leaf point together with diverse lithic artifacts documenting Levallois and non-Levallois reduction of local raw materials. Use-wear demonstrates that the leaf point was used as a hafted spear. The leaf point from Hohle Fels is the first artifact of its kind recovered from a modern excavation and the first recovered from a stratified context since Gustav Riek's dig at Haldenstein Cave in 1938. Traditionally, the leaf point horizon, or *Blattspitzengruppe,* of southern Germany, and Central Europe more generally, has been placed at the end of the Middle Paleolithic cultural chronological system. Current research at Hohle Fels raises questions about the validity of the traditional cultural chronology of the region and underlines the need for new, high quality cultural and chronostratigraphic information on the Swabian and Central European Middle Paleolithic.

Mots-Clés: excavating, Middle Paleolithic, southwestern Germany

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Reassessing the cultural stratigraphy and the techno-economic context of the Middle Paleolithic assemblages from Vogelherd Cave

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Although Vogelherd Cave in the Lone Valley of southwestern Germany is particularly well-known for its rich Upper Paleolithic assemblages and Aurignacian figurative art, the site's four Middle Paleolithic horizons also represent important points of reference for reconstructing Neanderthal behavior in the Swabian Jura. The original excavation under Gustav Riek's direction took place in 1931 prior to the advent of radiometric dating, which greatly limits the chronological resolution of our study. Nonetheless, the deepest archaeological horizon, AH IX, yielded lithic and faunal material including remains of a straight-tusk elephant that documents the use of the cave during the last interglacial. The overlying Middle Paleolithic horizons (AH VIII-VI) produced cold-temperate faunas that correlate with different phases of MIS 5, 4 and 3. The lithic assemblages from AH VIII and VII include small numbers of irregular bifacial artifacts, as well backed unifacial and bifacial knives. The latter tool category is traditionally associated the region's so-called *Keilmessergruppe*. These backed bifacial knives sometimes preserve negatives from resharpening blows. Roughly half of the Middle Paleolithic artifacts were made on variants of local Jurassic cherts, with lesser amounts radiolarite, alpine micro-quartzite, quartz and other raw materiasl. In addition to the lithic artifacts, bone retouchers are well documented, while the stratigraphic context of other organic artifacts remains uncertain.

The re-excavation of the backdirt from Vogelherd Cave between 2005 and 2012 led to the recovery of additional Middle Paleolithic artifacts that, while lacking optimal stratigraphic control, greatly augmented the small assemblages from the excavation in 1931. The lithics from the re-excavation include a range of previously overlooked diminutive tools including *groszaki*, small *keilmesser* and scrapers, which were typically made on raw materials other than Jurassic chert. These artifacts provide further techno-economic and typological information that help to illuminate the variability of the Swabian Middle Paleolithic, as well as offering new insights into the lifeways of Neanderthals from the region. The results from Vogelherd underline the difficulty of establishing a robust cultural stratigraphic system while also pointing to new patterns of technological behavior. Based on the comparative study of assemblages from other early excavations and results from new fieldwork and laboratory research, a regional pattern of diachronic change is coming into better focus. This paper highlights new results from Vogelherd, while assessing

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the strengths and weaknesses of the region's Middle Paleolithic record with regard to mobility, settlement dynamics and diachronic cultural change.

Mots-Clés: Vogelherd, Middle Paleolithic, lithic technololgy, settlement dynamics

Microwear analysis of animal teeth from the Middle Palaeolithic sequence of Sesselfelsgrotte (Germany): ecology of prey species and duration of occupation in the Mosuterian and Micoquian

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Land use patterns of Neanderthal groups, including seasonal mobility, are closely related to the ecological settings in which these groups lived. At Sesselfelsgrotte, a small cave in the Lower Altmühl Valley in Bavaria (Germany), the Middle Paleolithic part of the sequence, consistent with the first half of the last period of glaciation (MIS 5d to MIS 3), has yielded numerous assemblages of the Mousterian and the Micoquian/Keilmessergruppen, which were found interstratified in the Middle Paleolithic geological layers post-dating MIS 4 (G-Layer-Complex). Previous analysis of the lithic assemblages postulated a correlation between differences in the duration of occupation, closely related to divergent land use patterns, and the formal classification of the finds as Mousterian or Micoquian/Keilmessergruppen. Such changes in land use pattern evidently occurred in four cycles, each representing a new occupation of the region after a hiatus. The conclusion derived from these findings was the hypothesis that the two techno-typological industries belong to the same cultural entity, termed 'Mousterian with Micoquian option' (MMO). The objective of this study is to independently test this hypothesis by analyzing the tooth microwear patterns observable in the species found most abundantly at the site, horses and reindeer. The analysis of tooth microwear enables us to assess the duration of the occupations at the different stages of an occupation cycle and to establish the season or seasons during which the cave may have been occupied. The tooth microwear patterns observable in the horse and reindeer remains found in Middle Paleolithic levels of Sesselfelsgrotte revealed dietary habits noted in finds from the lower U layers that correspond to interglacial or warm interstadial conditions during the MIS 5, while those observed in the upper G-Layer-Complex indicate a steppe environment during the MIS 3. The analysis of the seasonality of occupations focused on assemblages from the G layers as the data base for the hypothesis of a Mousterian with Micoquian option at this site. It shows that, in the layers analyzed, all occupations took place during the summer season, but varied in length, as predicted by the Mousterian with Micoquian option model. These findings support the hypothesis that the shift from a circulating land use pattern with short-term residential camps at the beginning of a cycle and a radiating one with longer

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residential occupations of the site at the end of a cycle is the best explanation for the varying frequency of bifacial tools, including Keilmesser. The lack of significant differences in seasonality (all occupations occurred during the warm season) indicates that the season was not the principal factor influencing the duration of Neanderthal occupations at Sesselfelsgrotte; instead, increasing knowledge of the resources available in the region and the transfer of this knowledge, most probably within the same regional group, is likely to have been the determining aspect.

Mots-Clés: Microwear, animal teeth, ecology, Middle Palaelitic, Sesselfelsgrotte

How is Middle Palaeolithic sites variability linked to environmental conditions? A case study

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In the research of MP of central Europe, it has often been noticed, that in some areas it is more probable to find neanderthal settlements than in others. To some extent, it results from the research possibilities and the state of preservation of the sites and inventories, but it can be assumed with some certainty, that it is also partly due to the neanderthal preference of such areas. In most cases, sites are found in karstic regions, with numerous rock shelters and caves formed in the type of rock that accumulates heat during the day and radiates it in the night thus providing protection from the cold. Such a geological formation also provides usually sedimentary silica rocks, suitable for knapping and tool production. Yet there are some obvious differences between those site-yielding areas. The differences of landscape, climatic zone, also the presence of different species of fauna – all those can be observed on a diachronic and regional scale. Ultimately, in the conditions of the Middle Palaeolithic, such differences have led to technological and typological differences between stone artifact inventories. Those differences will be shown at an example of inventories from Oblazowa Cave site (single neanderthal site in the northern zone of the Carpathians mountain range), varying between one another and also different from the ones on the sites located in other central European clusters of MP sites. Landscape, faunal and climatic record, raw material quality, and accessibility will be discussed as a background for the techno-typological variability of assemblages.

Mots-Clés: West Carpathians, Oblazowa Cave, Middle Palaeolithic, landscape differences

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On the fringes of the main settlement areas: The Middle Palaeolithic of the Hérault department (Southern France)

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Although the Middle Palaeolithic of the southern France is a reference in many ways, it is mainly known in the Aquitaine Basin and the Rhône Valley where different techno-complexes were defined very early. However, certain peripheral zones or contact zones remain still little known for this period. This statement is mainly due to a scientific bias, both in the fieldwork and in the regionalisation of the research. In this communication we will present current research on the Middle Palaeolithic of the Hérault department (Languedoc area), which could be a cultural crossroads between different territories. To the south of the Massif Central, this region could indeed constitute a privileged circulation corridor for Neanderthal populations. Through fieldwork and the reexamination of old collections, several techno-complexes seems to be suggested with various raw materials used, from the Early Middle Palaeolithic with the site of Lunel-Viel I to the Late Middle Palaeolithic with numerous surface stations. The identification of this variety nuances the apparent technological monotony and omnipresence of the Levallois Mousterian on flint of the Languedoc-Roussillon.

Mots-Clés: Middle Palaeolithic, Lithic Techno, Complexes, Southern France, Mousterian, Raw materials

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S7-E: Examining cultural change and variability during the MSA over multiple spatial and temporal scales

Components, chronologies and forms of the bone industry in Africa

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From the excavations of Jacques Tixier, at Bordj Mellala in Algeria, and of Christopher Henshilwood and his team, in the Blombos cave in South Africa, through those carried out in Zimbabwe, in the Matopos, or even in the kingdom of Kerma in Sudan, the African continent has never ceased to provide us with bone industry that is both rich and varied. In the form of raw animal parts used or anatomical elements transformed or even sculpted, this industry was mainly made from the gathered, exploited and/or transformed hard material whose origin is animal: bone, ivory, horn, coral, mollusc and ostrich egg test, etc. This "osteodontokeratic culture" is very old there. Thanks to the pioneering work of Henriette Camps-Fabrer on North African and Saharan prehistory, the Capsian series were too at the origin of the first characterizations of bone tools. Along with the need to establish typological perspectives for comparison purposes, one of the hypotheses to be debated remains, precisely because of the value of this industry as a potential witness of the oldest traits of humanity and also of recurrence of certain types of bone tools of similar appearance nevertheless very distant in chronology, on the importance of the rainfed climatic phases and/or the arrays of the lake zones in the emergence and/or the diffusion of this industry on the African continent. Failing this, during dry climatic episodes or in arid zones, the function of the tools previously or otherwise designed may have been attributed to other raw materials, possibly with the same properties or profiles, or have disappeared if expected from same animal sizes, which theoretically will have engendered profound techno-economic and social transformations. Furthermore, nothing says that the elements of the industry - hunting weapons, ornaments, household equipment and funerary goods - are not exclusively linked to the exploitation of a certain type of matrices only (bucranium) or animal species in particular (elephant, ostrich), whether or not these were the basis of subsistence practices. In addition to the problems of preservation of sites and assemblages, it appears that Africa alone seems to record a very large informative potential that should be highlighted whatever the regions or chronological periods, from the Acheulean to the beginnings of pre-dynastic empires. This is why the session proposes to establish a state of knowledge on the genesis and forms of industrialization of these worked animal-based materials by pre- and protohistoric African cultures. Unpublished or synthetic presentations and those relating to series from specific chronological and/or palaeoenvironmental contexts will be favored according to various approaches and scientific fields, including the possible contribution of anthropology and ethnology.

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Mots-Clés: Bone industry, worked bone, ivory, shell, projectile point, tool, pendant, implement, relation industry to subsistance, relation industry to environment, industrial evolution

Gotera, southern Ethiopia and its place in the technological variability of MIS 3 in the Horn of Africa

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The Marine Isotopic Stage (MIS) 3 in East Africa is characterized by a period of important technological changes within the Homo sapiens groups. From the archaeological point of view, this period is significant for the presence of a transitional phase, reflected in the progressive decrease of MSA technological traits and the increase of elements characterizing the Later Stone Age (LSA). Despite the Horn of Africa has been integrated into the general issue of the MSA-LSA transition in East Africa, it is known that this phenomenon in the Horn seems to appear later than the rest of the East Africa region, dating it back to the end of MIS 3 (ca. 35-29 ka). However, because of the scarcity of data referred to the MIS 3 in the region, both archaeological and paleoanthropological, human dispersal dynamics are still not clear, as well as the interaction between populations. This generates a chronological bias in the reconstruction of Homo sapiens occupation and dispersal dynamics in the Horn of Africa.
The intra-site analysis of the Got-10 site, an open-air stratified sequence referred to MIS3 with lithic artifacts and faunal remains in situ discovered in 2018, shed new lights on an almost unknown area, which is placed far away from the Rift border, where the major archaeological evidences dated to MIS 3 are located. The analysis of these fresh data will constitute the basis for a future study at a regional scale, in order to be integrated within the general pattern of human occupation and dispersal dynamics in the Horn of Africa during the MIS3. Through comparative analysis with other archaeological contexts using quantitative multivariate statistics, it will be possible to better understand the causes and modalities of the MSA/LSA transition in the Horn of Africa region.

Mots-Clés: Ethiopia, MSA, Lithic variability, comparative analysis, multivariate statistic

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Revisiting Sibebe rock shelter, Eswatini: New results on the nature and timing of the final MSA in southern Africa

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Middle Stone Age (MSA) research in southern Africa has received considerable attention over the past decades. Sites with long stratigraphic sequences and extraordinary preservation conditions have attracted international awareness and produced important insights on human biocultural evolution. Since the onset of MSA research in the 1920s, however, there was always a strong regional preference on certain areas. This geographical bias becomes most evident when comparing the overwhelming amount of MSA sites investigated in South Africa to neighboring countries. While the multifaceted reasons behind this situation are not subject of the study presented here, it is a problematic situation as it constrains our view on Stone Age hunter-gatherers and past human lifeways during the Late Pleistocene. The small kingdom of Eswatini at the eastern border of South Africa is an excellent example. Although considerable research has been conducted here in the 1970s and 80s, demonstrating its rich archaeological heritage, Eswatini barely ever appears on the landscape of comparative MSA research. Here we provide new data on the age and techno-typological successions of the MSA lithic assemblages excavated in 1981 at Sibebe rock shelter by David Price-Williams, situated on the highveld of Eswatini. The assemblages show affinities with the final MSA of KwaZulu-Natal and provide the opportunity to further investigate the nature and timing of the end of the MSA in the southeast of southern Africa. Our findings and ongoing analyses put Eswatini back on the map of active Stone Age research.

Mots-Clés: Middle Stone Age, southern Africa

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Diachronic changes in the Howiesons Poort of Sibhudu and southern Africa

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The Howiesons Poort (HP) of southern Africa plays an important role in models on the early cultural evolution of *Homo sapiens*. Researchers have often portrayed the HP as a homogenous industry of the Middle Stone Age during the Late Pleistocene, with more recent work emphasizing parallel technological change through time across southern Africa. In this contribution, we study patterns of diachronic variation within the HP and examine their potential causal factors. We also test previous temporal assessments of the presumed homogeneity of the technocomplex at the local and regional level. Relevant data come from Sibhudu (KwaZulu-Natal) with its high-resolution HP lithic assemblages and comparisons with other southern African sites. At Sibhudu, unidirectional change in lithic technology characterizes the HP sequence. There is a gradual reduction in typical HP markers, including the proportion of backed pieces, blades and HP cores, as well as declining size of blades and backed artifacts. Quantitative comparisons with seven HP sites in South Africa suggest that lithic technology varies between regions over time instead of following similar changes. The regional diachronic patterns in the HP partly follow paleoclimatic zones, which could imply different ecological adaptations and disparate connection networks over time. Concerning hypotheses of causal drivers at Sibhudu, directional changes in lithic technology are associated with shifting hunting patterns towards larger-sized bovids and a gradual opening of the vegetation. Diachronic changes at other HP sites such as Diepkloof, Klasies River and Klipdrift appear to be associated with aspects of mobility, technological organization and site use. Divergent and at times decoupled changes in lithic traits across sites precludes monocausal explanations for the entire HP, supporting complex models for the observed technological trajectories.

Mots-Clés: Howiesons Poort, southern Africa, Sibhudu, lithic technology

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Using bird remains to reconstruct palaeohabitats at Sibhudu Cave, South Africa, from MIS 5 to MIS3

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Located in the subtropical biome of the Indian Ocean Coastal Belt of South Africa, Sibhudu Cave is a large rock shelter that preserves archaeological sediments associated with human occupations dated from the Marine Isotopic Stage (MIS) 5 until the MIS 3. The site has yielded the largest and most taxonomically diverse Late Pleistocene avifaunal assemblage retrieved in southern Africa to date. We have adapted the habitat-weighing method, which traditionally uses small mammals to propose palaeoenvironmental reconstructions, to the bird assemblage, in order to identify changes and continuities in the local habitats through time. We recognize the persistence of an evergreen forest throughout all phases of human occupation of the shelter. We have identified direct evidence for the occasional exploitation of forest birds by people. Existing data on mammals demonstrates a clear focus on species endemic to Afrotropical forests, namely bushpigs and blue duikers. Combined, these results indicate that the Late Pleistocene inhabitants of Sibhudu Cave were routinely exploiting animal resources from a subtropical environment from at least 100 000 years ago.

Mots-Clés: MSA, Avian Fauna, Paleoenvironment, Sibhudu Cave, Late Pleistocene Habitats

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Bifacials and ochres revealing MSA cultural dynamics during MIS3 with the West African site of Toumboura III (Senegal)

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The West African Middle Stone Age (MSA) holds a crucial role with respect to the evolution of humankind. In the last decades, the increasing wealth of new data, especially from research conducted in Mali and Senegal, allowed to overcome the neglect of West Africa in the discussion on cultural developments and human dispersals in Africa. The site of Toumboura III encompasses an occupation dated to 33 ka, shedding light on an unprecedented cultural expression of the MIS3 MSA, adding to the variability already suggested for the late MSA in this region.
Our combined studies on the lithics and the ochres led to point out the behavioural repertoire of Toumboura III. First, we performed a technological analysis of the lithic components following the *chaîne opératoire* approach. The lithic assemblage features a prevalence of bifacial shaping involving the production of different tool types such as standardised small bifacial points employing pressure flaking. Secondly, the technological and mineralogical analyses of ochre lumps also showed that part of the ochre pieces shows clear percussion marks. The iron content identified in the ochres is compatible with that of pigments, or with the haematites used in ethnographic contexts. In addition to providing data on a poorly documented period of West African MSA, Toumboura III has demonstrated technological and perhaps symbolic behaviours that are entirely new in the region. By revealing the appearance of innovations and technological particularities, these results on the techno-cultural dynamics in the MSA of MIS3 within West Africa contributes to the current scientific effort to enhance the knowledge on the complex Pleistocene population history in this part of Africa.

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Mots-Clés: West Africa, MSA, MIS3, bifacial technology, pressure technique, ochre use, cultural change

Technological behaviors and territory exploitation during the MSA in Eastern Morocco: Sahb el Ghar 1 & 2 open air-sites in chert procurement areas

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The Middle Stone Age (MSA) in Eastern Morocco is well-known by reference archeological sites as Rhafas, Ifri N'Ammar and Taforalt caves. However, MSA open-air settlement dynamics are practically unknown, due to the lack of systematic excavations and recording of archaeological sites, and only attested by disperse and unstratified lithic scatters or isolated pieces.

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During the systematic surveys performed in the Aïn Beni Mathar area in 2017 several stratified localities were discovered. They are located on slopes and exposed surfaces of riverbanks and are associated with a primary chert source area (the Swiwina plain). Two of them, Sahb el Ghar 1 & 2 (SBG1 & SBG2) were excavated during 2018 and 2019 in a surface of 9m2 each one.

In this paper we present the preliminary results of the technological and raw material characterization of the lithic assemblages (ca. 4,200 remains) recovered from the three archaeological levels identified at the SBG 1 & 2 stratified open-air sites. The dominant raw material used is chert (Neogene chalcedony > 98% of the total assemblage) with a potential exploitation area of ca. 5-10km2. These sites present homogeneous flake assemblages (including all the stages of the reduction sequence). The knapping strategies are mainly Levallois (recurrent centripetal and preferential flake modalities) and discoidal. Opportunistic knapping strategies and laminar technology have been also documented. Denticulates and scrapers are abundant within the retouched tools assemblages

The first data about these stratified open-air sites in the region will allow us to compare the technological behaviors, the human occupation patterns and the territorial exploitation dynamics between caves and open-air sites. Were *Homo sapiens* living in open-air areas as well as in caves? or Are these locations related to specific activities within their subsistence strategies such as lithic raw materials procurement? Are these occupations complementary to those in caves in the frame of *Homo sapiens* logistic and residential mobility?

In sum, this work will provide a broader perspective of the MSA technological behaviors and the settlement pattern dynamics in Eastern Morocco during the Late Pleistocene.

Mots-Clés: Lithic technology, raw materials, open air, sites, territory exploitation, Middle Stone Age, Eastern Morocco

S8-A: Mudbrick standardisation

¿When is a mudbrick standardized?

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Standardized building units are the fundament of modern day construction. As the oldest examples of this kind of unit are blocks of raw earth, understanding their emergence is therefore a theme of anthropological interest. The purpose of the paper is first to address what a mudbrick is, then the concept of its standardization and the methods to define it, and finally the sociopolitical contexts in which the process appears to have taken place, using a broad spatial and chronological frame.
In the first section, I'll review the different possibilities to obtain regularly sized blocks of earth for construction (handmade, made in different types of mold, cut in prepared mud layers or from geological strata), because these different processes will have an effect on the form and the precision of the size. Ethnographic, historical and modern examples will show the methods by which size is determined in each case.

Studies in standardization of archaeological mudbrick are still quite rare; some of them approach the question from the composition angle, many from the dimensions, measured from profile and plan drawings or in situ in walls or fills. All show some variation, which is why statistical analysis with evaluation of standard deviation is often the tool used to argument whether standard size exists (or not). Yet, production and construction techniques are rarely taken into account, as generally the use of a mold is presumed (because of its widespread use nowadays).
Mudbricks are still widely used to this day. They appear independently in at least 5 (sub)continents (Africa, Asia, Europe, North and South America), being later adopted worldwide, as is the case for other "inventions" like agriculture, ceramics, metallurgy, writing and state formation. As such, their emergence is associated to complex society. Standardization of size would be part of this process, as it implies the use of conventional measurement systems. Therefore, research into the production of regular mudbrick production in the so-called "cradles of civilization" and the cultures with which they interacted, seems the obvious place to address the problem of the process of its emergence and diffusion through technological transfer, adoption, or imposition. The correct identification of manufacturing technique and the use of comparable methods to define standardization will be key factors to understand these processes.

Mots-Clés: adobe, architecture, technology, archaeometry, measurement systems

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Mudbrick standardization: the case study of Egyptian Delta earthen production

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Evidence of multiple manufacturing practices regarding mudbrick standardization have been recorded at the archaeological site of Tell Timai, identified with the ancient city of Thmuis located in the Northeastern Egyptian delta. The analysis of multiple buildings identified so far three mudbrick traditions, which are characterized by different size, recipes and bricklaying. Notably, one of the domestic structures displayed two separate construction phases with diverse mudbricks. The mudbricks used in one of these phases showed strong similarity to the mudbricks used in separate, monumental public construction analyzed at the site. This new study builds on this foundation and expands the scope of this research to earlier protohistoric period by including new structures at Tell Timai and other sites in the Egyptian Delta in order to fully understand process of mudbrick standardization over time (e.g. central standardization vs local regional traditions). The samples are analyzed macroscopically by investigating their architectural characteristics, and microscopically by investigating geochemical and petrological features. This provides us with quantitative data that can then be used to understand skill transfer over time, the persistency of local traditions, and search for possible markers of centralization in mudbrick production in Egypt.

Mots-Clés: Egypt, mudbrick, earthen architecture, geoarchaeology, mensiochronology

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Standardized technology and form but no standardized sizes: Prehispanic adobe brick manufacture in the Zapotitan Valley, Southeastern Mesoamerica

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While Southeastern Mesoamerica has a tradition of earthen construction that dates to Pre-Columbian times, studies on the subject are scarce. This paper analyzes both how adobe bricks were manufactured during the Classic period (600-900 CE) at regional ceremonial center San Andres, in the Zapotitan Valley, El Salvador, and the social implications of their production. Comparing archaeological and experimental adobes, we argue that adobe bricks in San Andres may have been manufactured in wooden molds because they show: 1) square corners, 2) vertical striation on the sides, 3) slightly elevated ridges along the upper part of adobe bricks, 4) clay flow protruding from the lower part of adobe bricks. Additionally, measurement of 61 complete archaeological adobes bricks found at San Andres and other sites in the valley suggest that while manufacture technique and the form of the adobes were standardized, their size was not. The width and length of individual bricks varies considerably, but the height does not. The weight of adobes ranges around 17-45 kg (average 30 kg). This indicates that it would have been difficult to transport such big bricks so it is most likely they were manufactured on site. Given these data, we draw the following inferences for the archaeological case we analyze: 1) technological standardization is not related to adoption of a standardized measurement unit, 2) it is possible to construct massive buildings using adobe bricks of varying sizes; 3) large public buildings at San Andres could be constructed by communal and collective labor organization.

Mots-Clés: Adobe bricks, Standarisation, Pre, Columbian period, San Andres, El Salvador, Mesoamerica

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Between standardisation and traditions: the adoption of Ubaid architecture in Northern Mesopotamia and beyond from the middle of the 6th to the end of the 5th millennium BC

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The Ubaid expansion, from the South to the North of Mesopotamia should no longer be understood as a colonization of Southern Ubaid communities. The diffusion of Ubaid, from the middle of the 6th millennium to the end of the 5th, is a complex process, defined by G. Stein as "global" and "local" phenomenon. If this transformation is clearly demonstrated in Northern Mesopotamia with a so-called Halaf-Ubaid transitional period, especially with ceramic evidences, our study on architecture extends this issue to peripheral regions such as Southern Caucasus where intensive research is carried out for several years on Chalcolithic.
The adoption of Ubaid architectural techniques in Northern Mesopotamia is characterised by the spread of standardised moulded mud-brick, complex bonds and tripartite plans. Nevertheless, local techniques, as cob and stone foundations, persist in Northern Mesopotamia where Ubaid culture appears, proof of maintaining of technical and cultural traditions. In Southern Caucasus, Chalcolithic level at Mentesh Tepe (4300-4100 BC) is related to a tripartite building possibly linked with an intrusion of northern Mesopotamian origin. As in Northern Mesopotamia, the weight of tradition is strong in Mentesh Tepe as evidenced by the variability of moulded mud-brick sizes and simplicity of bonds, distinct to Ubaid techniques.
The aim of this paper is to show that the Ubaid expansion is reflected in architecture by a complex phenomenon: a general adoption of new techniques in the Northern regions, but also by the adaptation of Ubaid architecture to local "pressures". New data provided from Southern Caucasus, on the fringe of the Ubaid expansion, complete this overview on the correlation between transmission and assimilation of architectural techniques and social mechanisms.

Mots-Clés: standardisation, tradition, techniques, social mechanisms, architecture, Mesopotamia, Caucasus, Ubaid, Chalcolithic

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Looking for a possible origin for the adobe technique in the Douro Basin during the Third millennium BC: some clues and a lot of questions

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For decades has been said that the adobe technique appeared in the Douro Basin in the Early Iron Age, as one of the most significant aspects of the Soto de Medinilla culture. According to the dominant interpretation, the construction of resistant adobe houses was compared with the scarce evidence of temporary huts, built during the Bronze Age. The abrupt appearance of the adobe was used to prove the settlement of new human groups who brought new ideas and ways of living to the Spanish Northern Plateau during the first half of the first millennia BC. However, recent studies involving clay-based building materials from several settlements, both from the Copper and Bronze Ages have revealed some new information about the construction knowledge of the first sedentary populations. Despite the fact of the generalized use of the wattle and daub technique, some fragments have some macroscopic features that bear some resemblance with adobes. Those features are mainly referred to the shape, the presence of flat faces and how those are orientated, the inclusion and proportion of mineral and vegetal aggregates, and the general composition of the mud. These pieces could offer an alternative interpretation to the origin of the adobe in this area based on long-term local development of the technique, opposed to the traditional line of thought based on new settlers and the progressive alienation of the native communities.

Mots-Clés: Earthen Architecture, Adobe, Copper Age, Bronze Age, Northern Spanish Plateau, Spain

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Beyond adobe: Construction Techniques in the Early Iron Age settlement of El Castillar (Mendavia, Navarre, Spain)

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Since the first Iron Age settlement in Navarre was found in the 1950s, the vision of domestic architecture has not changed in any significant aspect. It is said systematically that during the Early Iron Age housing structures were rectangular and were built indistinctly in adobe or rammed earth walls with, in most of the cases, a stone plinth as foundation and a vegetal thatch sustained by wooden posts alongside the longitudinal axis of the house. That same interpretation was given for the structures unearthed in the 1980s in the settlement of El Castillar (Spain). However, the new research project on this settlement, which began in 2016, has revealed a slightly more complex reality. The study of several architectural remains discovered during these last five years has proven the coexistence of the mudbricks with other techniques, such as the wattle and daub and kneaded mud (among others) in the same domestic structure. The selection of each technique depended on the structural and domestic needs, which provides a new range of information about internal organization, finishings, thermic isolation, etc.

Mots-Clés: Early Iron Age, Navarre, Spain, adobe, wattle and daub, domestic architecture

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S8-B: Archaeometry of prehistoric and protohistoric stone, metal, ceramics and glass

Geochemical fingerprinting of Magdalenian chert tools from Caune de Belvis (Aude, France). New data about lithic procurement strategies and past territoriality in the Pyrenees

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Caune de Belvis (Aude, France) is located in the northern slopes of the Eastern Pyrenees, in SE of France. The site was excavated during the last decades of the past century, identifying several human occupations from the Late Mousterian (Maroto, Sacchi & Ortega, 2005) and the Magdalenian periods (Sacchi, 1995). Archaeological remains are mostly composed of faunal bones and a rich osseous and lithic industry. In this study we have focused on the analysis of lithic remains recovered in the Magdalenian levels.
The goals of this study have been to determine the territoriality of Magdalenian groups settled at Caune de Belvis and to identify their lithic procurement strategies. To achieve these goals, the recovered lithic remains from the Magdalenian levels as well as geological samples from the potentially used geological formations were analyzed using several analytical techniques. First, macroscopic studies were developed to determine the textural, micropalaeontological and mineralogical content. After this, geochemical analyses were conducted to quantify the elemental chemical composition. Energy-dispersive X-ray Fluorescence (ED-XRF) was used to quantify major and minor elements and Laser-ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) was then employed to quantify trace elements.

During the macroscopic analysis, it was attested that chert was the most used rock by Magdalenian groups, identifying until five different chert types. The geochemical analysis by ED-XRF and LA-ICP-MS allowed the establishment of differences between geological formations macroscopically identical and the connection between some archaeological chert types and specific

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geological formations.
Results have showed that different geological formations from the northern and southern Pyrenees were exploited by Magdalenian groups from Caune de Belvis, making evident the existent relation between both Pyrenean slopes during the Upper Palaeolithic and showing a great knowledge of the Pyrenean territory.

Mots-Clés: ED, XRF, LA, ICP, MS, chert, Upper Palaeolithic

Lipid residue analysis of Middle Palaeolithic lithic remains from El Salt (Alicante, Spain)

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The analysis of lipid residues preserved in archaeological materials has yielded a large amount of valuable data about past human populations. However, lithics, which are the most ubiquitous objects of Palaeolithic/African Stone Age sites have not yet been extensively studied through this analytical approach. Important issues such as the lipid retention potential in archaeological lithics, as well as the effects of post-depositional lipid migration from sediment to objects and vice versa remain unaddressed. In this study, we extracted lipid biomarkers from a set of flint flakes and limestone pebbles from El Salt Middle Palaeolithic site (Alicante, Spain) and analysed them using gas chromatography-mass spectrometry combined with compound-specific carbon isotope analysis. The lipid composition of the sediment surrounding each of the lithic objects was also analysed for comparison. Preliminary results suggest that the lithic remains preserve lipid biomarkers, and that these are different than those present in the sediment around them. Lithic objects also yielded smaller amounts of lipids than the sediment samples. These results highlight the preservation potential of the biomolecular Palaeolithic record and the importance of exploring it in different contexts, both in sediments and in other kinds of material record.

Mots-Clés: lipid biomarkers, lipid residues, stable isotopes, lithics, Middle Palaeolithic

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Beyond the Decoration; Mineralogical and Micro-structural Study of the Bronze Age "Life Cycle Jar Pottery" from Keshik Cemetery, Sistan and Balouchistan, Iran

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The present study focuses on a unique type of pottery, the so-called Life Cycle Jar, in association with 8 more sherds, which were discovered in the Keshik cemetery (3rd Millennium BC). The samples were investigated through classical analytical methods, such as thin-section petrography, XRPD and SEM-EDX in order to identify the production techniques, the structure, the surface finishing and the pigments used for the decoration. Mineralogical- chemical investigations revealed that the discriminating factors between the various potteries were significant from the technical point of view. The "Life Cycle Jar" sample shows the characteristics of wheel-thrown vessels with a definite orientation of pores in the thin section. Most investigated ceramics can be defined as being low-fired (ca. 750∘C), as indicated by the occurrences of inclusions in form of calcite within the matrix of the potteries. The other samples can be defined high-fired sherds (ca. 900∘C-1000∘C) and are characterized by the red and green color of the matrix. The microstructural characteristics of the potteries showed both low-fired and pre-sintering textures. The analysis of the pigments applied as decoration motives on the surface of the painted Life Cycle Jar Pottery, showed that the pigments consist of iron oxide-based minerals in the case of the red-orange color (like maghemite and hematite), and favorable manganese oxide in the case of the brown-black pigments on the vessels.

Mots-Clés: Ancient pottery, Life Cycle Jar, petrography, XRPD, SEM, EDX, Keshik cemetery, Bronze Age, Sistan, Balouchistan.

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The trajectory towards complexity: approaching the social value of copper at Bauma del Serrat del Pont Bell Beaker site (Northeast Iberia)

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Ascertaining the social value of copper (utilitarian vs. symbolic) and its purported role in the emergence and consolidation of hierarchies has been a topic of debate when dealing with early Western Europe metallurgy. Recent research shows that generalisations are increasingly untenable and highlights the need for comparative regional studies. The early metallurgy of Northeast Iberia allows us to explore the interaction between the well-characterised traditions of southern Iberia and southern France during the 3rd and 2nd millennia BC, given its location in an intermediate area.

pXRF, metallography and SEM-EDS were used to study seven Bell Beaker (decorated and undecorated) crucibles from Bauma del Serrrat del Pont (Tortellà, Girona). The results show evidence for smelting of different copper sources that differ in the presence of Ca-rich gangue. All crucibles were manufactured using a similar clay that contained mineral and organic inclusions.

Contextualising this data with reference to the metallurgical evidence available for the Northeast, makes possible (1) to sustain that copper metallurgy played a predominantly utilitarian role in Bell Beaker societies, and (2) to characterise idiosyncratic aspects of the metallurgical trajectory in the Northeast in relation to the consolidation of social complexity. This trajectory differs from the ones seen in the neighbour and contemporaneous traditions of Southern Iberia and Southern France. Differences between territories challenge unilinear explanations of technological and social development after the introduction of metallurgy.

Mots-Clés: Chalcolithic, copper, smelting, crucibles, Northeast Iberia.

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Copper supply networks in the Early Bronze Age of south-east Spain: new evidence from the Lower Segura Valley

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The range of copper sources and the nature of metal supply networks used by the El Argar culture of south-east Spain have been the subject of a long-running debate. On one side of this debate we have a model that envisages supply for much of the El Argar culture coming from a closely circumscribed region and controlled centrally by a political élite, while on the other side we have a model of a more decentralized supply network drawing on a wider, geographically more dispersed range of ore sources that is lacking the same level of political control. The available archaeometallurgical data are not entirely conclusive in this respect. While results from the existing, comparatively small body of lead-isotope analyses do seem to support the notion of a single main source region supplying most if not all of the El Argar culture area with copper, results from the much larger but not easily interpreted body of minor-element analyses would appear to lend support to the notion of a more decentralized supply. In this contribution we present new analytical data from the Lower Segura Valley, both from local El Argar artefacts and from local copper ores, which provide new insights relevant to this debate.

Mots-Clés: Bronze Age, copper, supply networks, lead isotopes, minor elements.

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Metallograhy of Hallstatt flat and lugged axes from the Czech territory

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Hallstatt flat-and-lugged iron axes belong to tools/weapons encountered in the broader Central Eu-ropean area, including – besides the territory of today's Czech Republic – Saxony, Poland, Austria etc. In recent years, a few metal-detector finds have been documented from the Czech territory, some of these surprisingly well preserved and not affected by cremation, which makes them very suitable for metallographic examination. Obtained results are important especially for understand-ing technological standards and traditions within the period from circa 750 to 500 BC. Up to date, a total of fifteen flat-and-lugged iron axes were examined across Europe, of which four come from the Czech territory. The results indicate that we cannot reject the possibility that in general up to half of flat-and-lugged axes had a cutting edge provided with quenched steel. When steel was re-vealed in a cutting edge, traces of quenching were very often documented as well. Collected data thus suggest that heat treatment of Hallstatt-period forgings could be a rather common practice.

Mots-Clés: Hallstatt Period, flat, and, lugged axe, Bohemia, metallography, ancient ironwork.

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Fragment of an iron bloom from the Pannonian tumulus of Regöly (Hungary) - the inception of iron working in the Carpathian Basin?

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According to our current knowledge, the fragment of a presumed iron bloom was found in the tumulus of Regöly, between Lake Balaton and the Danube in Hungary. This may be the earliest example of iron working in the Carpathian Basin (last third of the 7th century BC), and it raises several questions from both a historical and a technological point of view. From the end of the 7th century BC in the south-west of present-day Hungary, in Croatia and Slovenia, and in the area from the Danube to the Adriatic Sea, there were archaeological groups of related material cultures of eastern origin (Regöly, Kaptol, Martijanec). According to Herodotus, these can be identified with various tribes of the Sigynnae. According to their origins, they were probably Medes, later known as Illyrians and Pannonians. The discovery of the Regöly bloom fragment raises the possibility that the most ancient iron metallurgy and ironworking technology were directly brought to the Carpathian Basin by this population migrating from Asia Minor.
The goal of our archaeometric case study is multifaceted: our first aim is the characterization of the presumed iron bloom fragment, to see what kind of processing we are dealing with, and the second to see if the bloom fragment can be linked in any way to the iron objects found at the site. To answer these questions, examinations with optical microscopy (OM) and scanning electron microscopy (SEM-EDS) were carried out on the iron objects and the bloom fragment. Metallographic analysis of the latter revealed a highly specific microstructure, which indicates with certainty that it is not a primary product coming directly from the bloomery furnace, but a secondary or even tertiary product (prefabrication). In the case of the bloom fragment, traces of jumping and slag inclusions were also examined. The results of the metallographic analyses of the Regöly bloom fragment were compared with the microstructures of other iron blooms samples found in Hungary, such as a fragment of iron bloom from a Celtic workshop-type site (Bükkábrány, 4th-3rd century BC). A direct link between the examined iron objects and the iron bloom fragment as a possible raw material cannot be confirmed, however, at the same time, the iron artefacts, fragments of which were found at Regöly, might easily have been made from the basic material represented by the iron bloom (ingot) fragment.
Nevertheless, although the Regöly find does not provide evidence for the technology of iron smelting in the Carpathian Basin in the 7th century BC, it gives evidence for iron forging from a semi-finished product.

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Mots-Clés: iron, bloom, Carpathian Basin, optical microscopy, SEM, ED.

Archaeometric study of pre-roman pottery from the archaeological site of Bec Berciassa (Roccavione, Cuneo, North-west Italy).

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The archaeological site of Bec Berciassa is the most important protohistoric settlement in the Maritime Alps region in the province of Cuneo. It is situated at the confluence of the Gesso and Vermenagna rivers, at a height of 692 meters above sea level, it overlooks the surrounding valleys and transalpine routes that have been used since the late prehistoric period. Before the romanization of the region in the 2nd century BC, this hill had been occupied since the Late Bronze Age (LBA), 1550-1200 BC by the ancient Ligurian tribes.
The study of pottery individuates an older phase dating back to the Late Bronze Age, represented by a small sample of ceramics, while the chronology of most part of this material is homogeneously ascribable to a period between the 6th and the beginning of the 4th century BC (Iron Age).
The archaeometric approach to the study of ceramics has been conducted in a highly transdisciplinary context. The integration of the archaeological features, the texture and composition of the mixtures, the geo-archaeological reconstruction of the territory and its resources revealed parts of the history of the local communities that allow to shed light on many aspects, previously not yet defined, of this protohistoric settlement.
The ceramic fragments show a wide variety of mixtures (5 main types). They are mostly coarse-grained, iatal and serial-textured, calibrated with the addition of fillers. The fine matrix is very homogeneous in composition, although with compositional variations in terms of Fe2O3 and Al2O3. It is therefore possible to hypothesize a single source of supply. The different types of filler can be traced back to minerals and rocks that are found outcropping within the basins of the Gesso and Vermenagna rivers and can, therefore, be present as pebbles in their beds. Calcschists, spatic calcite, magmatic rocks (granites and aplites), and sericite-schists have been used since the Bronze Age; quartz sandstones and quartzites are instead present only in Iron Age pottery. At a macroscopic level, all these filler agents are light in color, tending to white, almost as if the color and homogeneity of the geological material were a criterion of choice, dictated more by tradition and know-how than by a technological reason.

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Mots-Clés: ceramics, pre, roman production, North, west Italy, raw materials, production technology, petrography.

Archaeometric investigation of pit-fire structures: a ceramic pyrotechnology experiment

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In the archaeological and archaeometric studies of ceramics, the definition of the thermal system of fire structures is a very important issue (Gosselain, 1992; McDonnell, 2001; Gibbs, 2015, Rice, 2015). Firing structures are associated with different thermal systems (Gosselain, 1992) that leave their traces both in the remains of kilns identified from archaeological excavations and in the fragments of ceramic objects.
The need of understanding the functioning of these types of kilns was the starting point for organizing a pyrotechnological experiment aimed at firing ceramic artifacts in a "pit" kiln, with a clay cover.
The created structure had dimensions of 1.0 m × 0.95 m and a depth of 0.5 m. The fire was lit using small pieces of dried wood, while charcoal was the fuel that sustained the firing phase, lasting about 2 days, until the fuel was completely exhausted, and the firing system cooled down. The use of thermocouples allowed the constant monitoring of the structure temperature on 5 different points for the duration of the experiment, until the temperature cooled down to about 150 ∘C.
The archaeometric investigation focused on the study of the fragments of the clay cover, on the walls of the firing pit (reddening rim) and on the fragments of ceramic artefacts. The analytical approach was based on the use of Optical and Scanning Electron Microscope, Electron Microprobe and X-ray powder diffraction.
The acquired data allow to evaluate the variation of the temperature inside the fire structure during the firing process. The comparison between thermal and mineralogical data represents the opportunity to verify the correlations between these two parameters.

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Mots-Clés: ceramics, ancient pyrotechnology, experimental archaeology, pottery firing, firing temperature, XRPD, OM, SEM.

A comprehensive PXRF characterization of obsidian from the Hopewell Site, Ross County, Ohio held in the Field Museum collections

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The Middle Woodland period (c. 200 BC – AD 300) is archaeologically most notable for the development of continental scale networks through which objects and materials were acquired by inhabitants of eastern North America. Obsidian is present in many Hopewell/Fort Ancient sites, but the nearest possible sources of this material are far to the west in Wyoming and Idaho. The eponymous Hopewell site, in Ross County, Ohio, was excavated by W.K. Moorehead between 1891-1892 to provide material for display at the 1893 World's Columbian Exposition. Subsequently, the resulting collection was incorporated into the early collections of the Field Museum. The Hopewell site is notable for the huge volume of imported material present there, including large bifaces made of obsidian. These were compositionally analyzed by James Griffin in the late 1960s. Griffin's work (and several subsequent analyses) demonstrated that two sources, Obsidian Cliff (Wyoming), and Bear Gulch/Camas-Dry Creek were present in the Hopewell assemblage. However, owing to the destructive sampling necessary to conduct compositional analyses at the time, only a handful of smaller bifaces and debitage pieces were measured. Here, we use non-destructive PXRF analysis to characterize the entire Field Museum Hopewell collection. In common with earlier analyses, we find that Obsidian Cliff and Bear Gulch obsidians comprise the bulk of the collection, with the exception of a single piece of debitage from the Malad source flow (Idaho). We discuss these results in comparison to stylistic and technological variability within the Hopewell assemblage, as well as comparison to studies of obsidian from other Middle Woodland sites.

Mots-Clés: Hopewell, Middle Woodland period, obsidian, PXRF.

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Preliminary data on the frescoes from Novgorod

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This paper presents the first analytical data obtained by using a pXRF on the fragments of stunning Russian-Byzantine frescoes recovered from an excavation at Veliky Novgorod, one of the oldest cities in Russia and UNESCO World site. The archaeologists of the Institute of Archaeology of the Russian Academy of Sciences have been working on the architectural excavation at Novgorod for over 20 years and in the last 7 years fragments of frescoes have been unearthed during the excavation of the church of St. George in the Yuriev Princely Monastery (built in 1119). In the layers of the 12th century AD a large number of fragments of wall paintings from the church was found. A further interesting detail is that the paintings showed graffiti inscriptions recording deaths and the circumstances of death of persons that are mentioned in the chronicles of the time. The frescoes are highly interesting and extremely important for the reconstruction of the history of the time.
A number of samples, subdivided by significance and color and grouped accordingly are first autoptically examined, then studied by digital microscopy directly in the storage rooms at the excavation site. The scope is that of recognizing possible typical details, such as lines or ridges, indicating the working days of the artists, and layers of colors, that might help understanding the working habits of the painters. For the first screening and classification of the fragments the analytical data are collected by using pXRF Bruker.
All phases of the study are recorded and documented by photos and microscopy of details.
This research was carried out within the state assignment of the Ministry of Science and Higher Education of the Russian Federation (theme "Pre-Mongol frescoes in Novgorod: archaeological context and scientific research: The frescoes of St. George's Cathedral, Yuriev monastery, from the 2013–2020 excavations").

Mots-Clés: Russian, Byzantine frescoes, Veliki Novgorod, Yuriev Princely Monastery, pXRF, microscopy, pigments.

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S9-A: Creating in tropical forests: toolkits and technical behaviours of prehistoric hunter-gatherers between 23◦ North and 23◦ South.

The lithic technology at Maomaodong Rockshelter, southwestern China: diversity and creativity of the cobble tool industry in a sub-tropical environment during the late Late Pleistocene

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Since the 1940s when Hallam L. Movius divided the Paleolithic cultures into two contrasting regions across the old world, the lithic technology in East Asia was usually considered as a different and independent phenomenon compared with its western counterparts. In particular, the persistence of the cobble tool industry dominated by chopper-chopping tools in southern China from the Early Pleistocene to the Early-Middle Holocene gives researchers an impression that lithic technology in this area is very simple, primitive, changeless and lack of creativity. However, with much fieldwork and research in the past 20 years, such impression was largely changed due to remarkable progress including the discovery of the bifacial industry in Bose, Guangxi, and the finding of Hoabinhian sites in Yunnan Province, which enriched our understanding about the diversity of the cobble tool industry in this region. As one part of our research project on the technology of the lithic industry in southern China, a new technological analysis on the lithic assemblage of Maomaodong Rockshelter on the Yunnan-Guizhou Plateau has revealed certain creativity and diversity about the lithic technology, especially the abundant bipolar products resulting from the concept of *split (bipolar flaking on strictly selected cobbles and pebbles)*. This site dates to the Late Pleistocene-Early Holocene transition while similar technology had been reported at other sites, among which the earliest could be traced back to about 50 ka in this region. The new analysis creates new possibility to discuss the origin of a new technological concept in southwestern China under a sub-tropical environment during the late Late Pleistocene and its influence on the nearby regions.

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Mots-Clés: cobble tool industry, Southwest China, lithic technology, bipolar débitage, late Late Pleistocene

Operational chains and technical decision making in the MSA in the rainforest of Equatorial Guinea

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The plasticity of technical behavior is considered a characteristic of the "modern cognition" of Homo sapiens and is the ability to adapt resources to specific needs to obtain a specific result, while a rigid (non-creative) behavior that is conditioned The properties and quality of the raw material is considered a condition of a "non-modern" mentality, either in Homo sapiens or in other hominin species.
The colonization of new ecosystems is another sign that is considered diagnostic of modern behavior. In order to document the appearance and dispersion of Homo sapiens in the rainforests of Central Africa, several sites of the Middle Stone Age (MSA) period have been excavated in the continental territory of Equatorial Guinea. The paleoenvironmental reconstruction of the MSA occupation of the Mabewele I site clearly demonstrates the habitation of human beings in the Guinean rainforest.

On the other hand, the analysis of operating chains of the lithic excavation and surface industry allowed to demonstrate the coexistence of four different technical processes in the same site and, most likely, contemporary with each other.

The presence of four different operational chains on the Mabewele site, which are not conditioned by the quality or class of raw material and that lead to different kinds of tools, documents the technical ability of the human beings who colonized the rainforest of Equatorial Guinea, approximately 50,000 years ago and the "modern" nature of their cognition, both by choosing the material and the appropriate technical procedure for each objective, and by their ability to survive and even modify the jungle environment for an extended period of time during the Pleistocene superior.

La plasticidad de comportamiento técnico es considerada una característica de la "cognición moderna" de *Homo sapiens* y consiste en la capacidad de adecuar los recursos a las necesidades específicas para la obtención de un resultado concreto, mientras que un comportamiento rígido (no creativo) y condicionado a las propiedades y calidad de la materia prima se considera una condición de una mentalidad "no moderna", ya sea en *Homo sapiens* o en otras especies de

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homininos.

Mots-Clés: Homo sapiens, complex cognition, MSA, operative chains

L'Acheuléen sénégalais dans le contexte ouest africain

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L'Acheuléen parmi les périodes les moins documentées du Sahel ouest africain. Même si des industries s'apparentant à l'Acheuléen ont pu être identifiées au Sénégal au Mali en Mauritanie et au Burkina Faso, la plupart des sites restent à ce jour indirectement datés. Dans ces industries, le biface et le hachereau apparaissent comme les outils caractéristiques.
Cependant, notre connaissance de la carte de la distribution et de la circulation des groupes humains est très limitée dans toute l'Afrique de l'Ouest. Si l'acidité des sols est mise en cause quant à la rareté de restes organiques datables et interprétables avec précisions, il faut aussi reconnaître le manque de collaboration entre chercheurs qui est un handicap majeur pour comprendre la variabilité des contextes archéologiques et chronologiques et les stratégies et modes d'adaptation des hominiens à des contextes paléo-environnementaux en changement constant.

Contrairement à l'Afrique de l'Est, du Sud et du Nord, les sites acheuléens ouest afrcains sont rarement stratifiés et les restes humains sont absents. De ce fait, il est difficile de mettre en évidence les dynamiques de peuplements de l'Afrique de l'Ouest dans les processus d'hominisation.

Situé à l'ouest du continent africain, le Sénégal se trouve dans le domaine climatique soudano-sahélien. C'est également une zone de contact et un véritable creuset de civilisations, qui semble avoir mis en relation des peuples de la forêt et de la savane.

Les témoins des occupations disent acheuléennes ont été conservés en différents points de la vallée de la Falémé, au sud du pays, et dans la région de Dakar, à l'ouest.

La Falémé, partie sud du pays (région de Kédougou à la limite du Mali et de la Guinée) présente les paysages géologiques les plus anciens avec des reliefs assez variés. Le fleuve Falémé qui a incisé dans son cours inférieur la série dite "des schistes de la Falémé" est constitué par des pélites, d'où viennent s'intercaler des roches dont les préhistoriques ont taillé pour leur au quotidien (silexites à faciès jaspoïde , grès-quartzites, grès mauves ou rouges, quartzite, quartz, etc.).

Quant à la région de Dakar généralement plaque hormis quelques endroits qui témoignent d'un volcanisme ancien, les industries dites acheuléennes caractérisées par le biface et le hachereau, sont globalement hors contexte avec une utilisation du silex qui affleure à plusieurs endroits.

La présence d'un biotope exceptionnel et une disponibilité de roches taillables a fait du Sénégal un endroit idéal pour les occupations humaines acheuléennes.

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Ainsi, nous présentons l'étude du matériel lithique des sites de Karé, Sansandé, Missira, le Ravin blanc et de Fann au prisme d'une approche techno-typologique.
This communication cherche à esquisser une synthèse des occupations acheuléennes de la zone sahélienne et ouvrir de nouvelles hypothèses sur la période acheuléenne en Afrique de l'Ouest. L'objectif est de mieux comprendre les choix stratégiques de l'Acheuléen afin de déterminer les affinités culturelles régionales et la continuité techno-culturelle. Nos questionnements portent sur les processus d'adaptation et la mobilité des groupes humains acheuléens dans les multiples contextes environnementaux du Sénégal où les hommes sont retrouvés.

Mots-Clés: Acheuléen, Sénégal, Afrique de l'ouest, mobilités, stratégies

Exploring stone-tool technology in the Congo Basin from the Earlier to the Later Stone Age

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First hominids arrived in the Congo Basin more than 2 millions years ago. A complete sequence of occupation has been exposed in different valleys of the region covering Earlier to Later Stone Age. During the Oldowan and the Acheulean, lithic tools testify of a homogeneity with the other African regions. However, from the Middle Stone Age, a regional techno-cultural facies emerged in the Congo Basin and its periphery. The importance of shaping in stone-tool production and the richness of heavy-duty tools led scholars to argue that Middle Stone Age populations adapted their tool-kit to the African rainforest. During Late Pleistocene and Early Holocene, the Later Stone Age facies multiplied, suggesting the existence of different techno-cultural traditions inside the Congo Basin. Despite this apparent rise of regionalization in Central African Stone Age, Prehistory in the Congo Basin remains poorly documented, possibly due to historiographic reasons. This is especially the case for the Pleistocene, whose records lack paleoenvironmental data and chrono-stratigraphic contexts.

Using a diachronic frame, we will explore the different hypotheses about the arrival of the first humans, the rainforest landscape occupation modalities and the inter-regional influences. To do so, we will present the results of assemblages analyses that we conducted combined with data available in the literature. Eventually, we will discuss the current knowledge of the Prehistory of the Congo Basin and the existence of particularities in the tool-kits of the African rainforest.

Mots-Clés: Congo Basin, tool, kits, Pleistocene, diachrony, rainforest, technology, lithic

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L'industrie lithique de l'Âge de la Pierre Récent de l'abri sous roche de Nangara-Komba en République Centrafricaine

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Les fouilles de l'abri sous roche de Nangara-Komba dans la zone de Carnot, sur la marge nord du bassin du Congo, ont permis de déterminer une longue occupation anthropique intermittente et intensives à partir de 5100 cal BC. Une abondante industrie lithique sur support de quartz est collectée dans les quatre strates archéologiques mises au jour par les fouilles. Ce corpus de plus de 30.000 pièces offre, en partie, des galets polis de quartz ou de quartzite comme matière première et le reste du corpus se distribue quantitativement entre un très important débitage et un outillage en infime quantité.
Ainsi, se dénombre majoritairement, les nucleus à plusieurs plans de frappe, suivi respectivement, des nucleus globuleux, à débitage centripète ou à lame. Les éclats présentent le décorticage du nucleus et ils se développent jusqu'au plein débitage. Les fragments et déchets sont numériquement la classe la plus importante de cette industrie lithique. Les outils se composent de petites pièces utilisées ou retouchées, de pièces bifaciales, de galets taillés et voire, de pointes de jet. Nangara-Komba représente un contexte d'abri-sous-roche de l'Afrique centrale où l'utilisation d'outils lithiques semble avoir persisté assez tardivement en holocène.

Par ailleurs, le site semble avoir été utilisé uniquement par des groupes de chasseur-cueilleurs qui ont finalement interagi avec des agriculteurs et des locuteurs bantous et plus tard les oubanguiens. De nombreux panneaux d'art rupestre ornent les murs de l'abri et la céramique parait avoir été initialement apportée sur le site entre 1050 et 900 cal. BC, sinon plus tôt. Des fragments d'endocarpes carbonisés de *Canarium schweinfurthii* ont été collectés dans tous les accumulations stratigraphiques et indiquent l'utilisation ininterrompue du canarium pendant toutes les périodes d'occupation de l'abri. C'est aussi pour le moment, le seul site connu en République Centrafricaine, en haute vallée de la rivière Sangha, avec des occupations alternées couvrant le passé sur c. 7000 ans.

Mots-Clés: Holocène, industrie lithique, abri sous roche

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A technological reappraisal of the Earlier Stone Age lithic artefacts of Baboungué, Central African Republic

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The development of Pleistocene lithic technology in Central Africa needs to be investigated more deeply. In this area, sites attributed to the Earlier Stone Age (ESA) are rare despite their importance for documenting early hominins behavioral variability in Africa. Among the few registered sites, Baboungué open air localities, is located in the Sangha River Basin, close to the town of Nola in southwestern Central African Republic, delivered ESA remains, which weregathered by Roger de Bayle des Hermens in the late 1960s.. The site delivered an assemblage of Earlier Stone Age lithic artefacts collected by Roger de Bayles des Hermens in the late 1960s and are cCurrently stored at the Muséum National d'Histoire Naturelle (*Institut de Paléontologie Humaine)* in Paris,(France), the Baboungué lithic assemblages originated from . Ttwo identified localities, namedlocalities have been identified: Baboungué 1 and Baboungué 2. The collection comprises 90 diagnostic lithic artefacts for both localities (n=Baboungué 1=26 / Baboungué 2 =and n=74 respectively). All the lithic artefacts have been characterized and categorized by R. de Bayle des Hermens based on a their morphological and typological approachattributes: pebble tools, flakes, cores, and slab tools. In 2021, we restudiedrenewed our approach on these these assemblagestwo collections, Baboungué 1 and Baboungué 2 using updated lithic technology approaches aiming to highlight (the flaking and shaping reduction strategies), . Nevertheless, we re-usedwhile keepingand completing the the original classification of R. de Bayle des Hermens and completed it (large flake tools, trifacial shaped tools). Finally, we applied techno-functional analysis in order to highlight give new insights on the structural specificities of the shaped tools of theses assemblages.

Mots-Clés: Baboungué, Earlier Stone Age, flaking, shaping lithic technology, techno, functional, reduction sequence, shaped tools.

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Le core-axe, un outil tropical à redéfinir

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Dans le cortège lithique du Middle Stone Age (MSA) et surtout en Afrique centrale, une pièce emblématique est souvent retrouvée au sein des assemblages. Il s'agit d'outils réalisés par le façonnage et caractérisés par la présence de deux bords parallèles à des sous-parallèles qui ont été classés par de nombreux auteurs comme des axes-noyaux .
Ces axes principaux sont prévus comme fossiles directeurs du Sangoen-Lupembien, les deux faciès du MSA d'Afrique centrale mais dont les assemblages lithiques sont souvent mal contextualisés. Néanmoins, il est de plus en plus clair que ces outils façonnés se retrouvent jusqu'au dernier âge de pierre.

Ces outils nous intéressent car ils ont conduit à plusieurs hypothèses sur l'emmanchement, l'adaptation aux milieux forestiers, le travail du bois, de la terre et la chasse. De plus, ces pièces ont fait l'objet d'un parallélisme ethnographique avec les haches et herminettes emmanchées. Malgré tout, les axes de base restent encore mal définis sur le plan technologique. Parmi les définitions du core-ax des différents auteurs, aucune ne semble faire consensus. La plupart d'entre elles se basent sur des critères morphologiques ou fonctionnels pour décrire ces outils et ces définitions ne s'accordent pas notamment quant aux parties actives et la morphologie de la section. Par conséquent, nous avons réalisé une étude productionnelle et techno-fonctionnelle sur un corpus provenant de mêmes sites Nzako Kono et Nzako Ambilo en République Centrafricaine. C'est dans le mais de comprendre la variabilité technique au sein d'un groupe techno-typologique cohérent sur le plan chrono-stratigraphique et ainsi discuter de la variabilité de ce type d'outils façonnés à bords parallèles, typiques de la Préhistoire en Afrique centrale

Mots-Clés: MSA, Core axe, Emmanchement, Afrique Centrale, Technologie Lithique, Techno fonctionnelle, Nzako

*Intervenant

Tropical foraging in Island Southeast Asia during the Last Glacial Maximum: evidence from Palawan, Philippines

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This study presents archaeological evidence for changing subsistence strategies within the tropical island environments of Palawan Island, Philippines. New radiocarbon dates and subsistence data are reported for Pilanduk Cave based on our re-excavation project in 2016. The cave was originally excavated by Jonathan Kress in 1970, from which he presented evidence for Pleistocene occupation. Vertebrate taphonomic data from Pilanduk show evidence for specialised deer hunting in the Palawan interior during the LGM. Combined with Late Pleistocene and Holocene subsistence data across the island, the Palawan record demonstrates the shifting foraging behaviours of modern humans occupying variable tropical environments of Island Southeast Asia.

Mots-Clés: Southeast Asia, Philippines, tropics, zooarchaeology, taphonomy, foraging

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Bone tool technologies in the Raja Ampat Islands, West Papua: chronology, production, and use

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Early–Mid Holocene sites in northeastern Indonesia and northwest New Guinea may be characterised by few lithics but relatively common bone tools. This paper examines the nature of bone tool production, use, and discard in this region, drawing on recently excavated assemblages from Waigeo Island in the northern Raja Ampat group, off the northwest Bird's Head of New Guinea. It refines the chronology of bone tool production in the area and compares these results with nearby equatorial sites on the Bird's Head of New Guinea, Maluku, and Sulawesi. The implications of this osseous technological zone are discussed in the broader context of human behavioural adaptation and innovation in tropical forests.

Mots-Clés: Bone tools, Osseous technology, Tropical forests, Indonesia, New Guinea, Wallacea, Pacific, Southeast Asia

*Intervenant

S10-A: Occupation in mid-latitude Eurasia during the Last Glacial Maximum and shortly thereafter

Mitoc-Malu Galben, la continuité d'habitats entre 32.000 et 20.000 ans B.P. dans l'espace carpato-dniestréen

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Dans la grande station paléolithique de Mitoc-Malu Galben, sur le Prut, nous avons identifié plusieurs niveaux d'habitat, appartenant à l'Aurignacien et au Gravettien.
Sur la base des technocomplexes lithiques, ainsi que des déterminations de chronologie absolue, on peut mettre en évidence l'existence d'une continuité d'habitat durant tout le Wurm récent, en général, entre 32.000 années BP et 20.000 années BP.

A la présence des types et sous-types d'outils finis, nous ajoutons la présence des pièces carénées (grattoirs, burins) de facture aurignacienne dans tous les technocomplexes de facture gravettienne, de même que la présence des lamelles Dufour dans l'Aurignacien et le Gravettien, ou des outils sur éclats.

Nous constatons, à Mitoc-Malu Galben aussi bien que dans les autres stations paléolithiques de Mitoc (Parau lui Istrati, Valea Izvorului, La Pisc, Valea lui Stan) la présence de pièces (outils) de facture plus ancienne, du Paléolithique moyen (racloirs, rabots, pièces à talons facetté, pièces sur éclats, etc) dans les niveaux d'habitat et les technocomplexes aurignaciens et gravettiens. La situation de Mitoc est presque identique dans d'autres gisements aussi, datées dans le Paléolithique supérieur ancien et récent de toute la zone géographique entre le Prut et le Dniestr. Sur la base des supports et des outils en matières premières allogènes, nous pouvons accepter la présence de communautés humaines externes, à Malu Galben ou à Parau lui Istrati, qui ont taillé les outils à partir de matières premières spécifiques aux campements d'origine, mais elles sont venues à Mitoc avec leurs propres techniques de taille et avec des outils de facture plus ancienne.

Mots-Clés: Paléolithique supérior ancien, Paléolithique supérieur récent, silex étrangère, continuité d'habitat.

*Intervenant

Last Glacial Maximum ocupations in the Ceahlău Basin

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When compared to other relatievly ignored regions of present-day Romania, the Paleolithic record in the eastern part of the country has been systematically investigated over the last seven decades, especially the middle sectors of the Bistrița and Prut rivers. Although it yielded a significant settlement density, the Eastern Carpathian UP record remained for decades under-represented in regional or continental syntheses, mainly due to the unusual proposed interpretations. Lately, a series of reassessments based on previously recovered data, supplemented by new field researches and chronometric measurements aided to an improved understanding of the regional UP record. In addition, the identification of new settlements, unaffected by previous researches and accessible to excavations based on up to date research methodologies is still possible. Bistricioara-Lutărie III is one of these sites. Although only partially explored, this site located in the middle of the Ceahlău settlement concentration brought a wealth of archaeological, chronometric and paleoenvironmental data, critical to the understanding of the recurrent occupations throughout the entire LGM in the area.

Mots-Clés: Upper Palaeolithic, LGM, Eastern Carpathians, Ceahlău Basin, multilayered sites, recurrent occupations

*Intervenant

L'Europe moyenne au dernier maximum glaciaire : abandon, occupation saisonnière à la bonne saison ou peuplement permanent ?

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Le climat du dernier maximum glaciaire est à l'origine d'un processus d'effondrement des sociétés de chasseurs-cueilleurs paléolithiques. Le modèle généralement accepté depuis une trentaine d'années est celui de l'abandon de l'Europe moyenne, et la migration progressive et le refuge des populations dans les régions méditerranéennes. A la fin du dernier maximum glaciaire, la recolonisation progressive de l'Europe moyenne par le Magdalénien à l'Ouest et le Mézinien à l'Est est également bien établie. De 22 000 à 17 000 BP, cependant, des variations climatiques sont à l'origine de contextes favorables aux déplacements saisonniers à la bonne saison ou de réadaptations par des peuplements permanents en Europe moyenne. La présente communication a pour objectif de préciser les modalités et les moments de ces réoccupations.

Mots-Clés: LGM, permanent setlement, seasonal setlement

*Intervenant

La recolonisation du bassin du Dniepr après le dernier maximum glaciaire

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Durant le dernier maximum glaciaire, les groupes de chasseurs-cueilleurs ont abandonné la grande plaine de l'Europe orientale pour se réfugier plus au Sud sur les bords de la mer Noire, alors un lac. Des peuplements importants de groupes épigravettiens occupent alors la zone des steppes sur le pourtour septentrional d ela mer Noire où ils chassent principalement le bison et les vallées du piémont septentrional des Carpates (Dniestr, Prut, Bistrita) où ils chassent principalement le renne.
A partir de 15 500 BP, l'ensemble du bassin moyen et supérieur est peuplé par les groupes du Mézinien qui vont réoccuper la grande steppe froide à mammouths et y laisser les habitats à cabanes en os de mammouths bien connus dans la littérature.

L'objet de cette communication est d'analyser à partir des rares données disponibles sur les sites de la grande plaine le processus de passage entre ces deux peuplements, entre abandon total de la grande plaine, déplacements à la bonne saison ou peuplement permanent.

Mots-Clés: LGM, Mezinian Epigravettian

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The Pavlovian along the Danube: New perspectives on the early Gravettian in Austria

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The open-air sites of the Middle Danube region rank among the significant Gravettian occupation zones in Central Europe. Recent investigations carried out by the Austrian Academy of Sciences added another findspot to this Mid Upper Palaeolithic key-region, the site Gösing-Setzergraben. Based on techno-typological analysis of the lithic assemblage, the most extensive archaeological layer at this site can be attributed to the Pavlovian, a regional entity of the Gravettian centered around Moravia. With consideration given to the new data, this presentation reassesses the Pavlovian industry in Austria and aims at providing new insights into the organisation of hunter-gatherer communities in the Middle Danube region. In addition to technological and typological analysis, this includes the examination of raw material procurement patterns and subsistence strategies as well as considerations regarding site function. Subsequently, the Pavlovian sites in Austria will be contextualized on a supra-regional level within the framework of the overall Pavlovian network.

Mots-Clés: Gravettian, Pavlovian, Lithic industry, Raw material economy, Middle Danube region, Gösing–Setzergraben

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New data on Upper Paleolithic in Central Asia: Ushbulak and Karasai sites (Kazakhstan)

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Ushbulak (ShiliktyValley, Eastern Kazakhstan) is a stratified site (8 layers). According to the recovered artefacts and their features, as well as the stratigraphic position, and associated faunal remains, four major cultural and chronological units have been tentatively established, including the Holocene assemblage (layer 1), the final UP assemblage (layers 2.1-3.3), the developed UP assemblage (layers 4-5.1), and the initial UP assemblage (layers 5.2-7.2).

The assemblage from the lowermost layers 5.2-7.2 contains blade cores with the opposite semi-tourne platforms, numerous core trimming elements, end scrapers on large blades, including those with ventral hewing of the base, truncated-faceted tools, truncated blades, burins and a tanged point. Core trimming elements correspond well to the available cores. The majority of core trimming elements (crested, plunging, and marginal laminar spalls) illustrate laminar volumetric and semi-volumetric reduction. Based on the composition of the lithic industry, layers 5.2-7.2 can be defined as a lithic workshop at the outcrops of raw material. In terms of tool types, the Ushbulak lithic industry is similar to the stratified assemblages attributed to the IUP in Southern Siberia (Kara-Bom site and others) and Northern Mongolia (Tolbor-4 site and others). Detailed luminescence dating was applied for age determination of main archaeological layers and proluvial-colluvial deposits of the site, with comparative dating using OSL and IRSL methods. Detailed age model was created using Bayesian statistics on the basis of IRSL-chronology and additional 14C ages. The performed research provides the exact time of the main settlement of studied site - about 46,000 years ago, i.e. in the second half of MIS 3.
The second assemblage is connected with the appearance in Eastern Kazakhstan industries with micro- and small-blade percussion which started to use pressure technique. Raw material base and technical-typological characteristics of the industries have changed dramatically. The earliest complexes of this type identified in level 5.1 at Ushbulak site and dated about 23,000 BP.

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The latest assemblage are known in levels 3 and 2 at Ushbulak site – about 16,000-14,000 BP. Possibly these industries can be correlated? by the main array of finds at Shulbinka site (MiddleIrtyshValley, Eastern Kazakhstan) which collection, according to new data, includes two complexes – of the Final Paleolithic and one of the Pleistocene/Holocene transition.

The Final Paleolithic tradition with the combination of large-blade and micro- percussion is connected with the Holocene boundary. The micro-percussion is aimed at the removals of bladelets and microblades from volumetric prismatic and narrow front cores by pressure. These materials are most fully presented at Karasai site (ShiliktyValley, Eastern Kazakhstan). Stratigraphic situation, characteristics of the archaeological materials, and series of dates – about 10,000-9,000 BP – allow us to assign the main complex of finds to the Mesolithic.
Research was supported by Russian Science Foundation project # 21-78-10146.

Mots-Clés: Central Asia, Kazakhstan, Upper Paleolithic, lithic assemblage, cores, lames, tool assemblage

New data on the duration and seasonality of the functioning of habitation sites in the Upper Desna basin after the Late Glacial Maximum

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Several well-known large sites of the late stage of the Upper Paleolithic (20000–12000 BP) were discovered in the Upper Desna basin. Among them are Timonovka 1 and 2, Suponevo, Eliseevichi 1, Yudinovo and others. They are considered as long duration "giant settlements" with dwellings made of mammoth bones. Problems of duration and seasonality of their functioning are a matter of scientific discussions for about several decades. Results of our long term multidisciplinary research of the Desna sites including archeological, paleogeographic, stratigraphic, archeozoological, pollen data and also analyses of documentation from excavations of 1940-1960-ies (which was considered lost for a long time) give grounds for treatment "giant settlements" as places which were inhabited by people of mostly similar cultural traditions during hundreds of years with relatively short breaks during various seasons and with various duration.

Mots-Clés: Late stage of the Upper Paleolithic, Eastern Europe, Desna basin, sites with dwellings made of mammoth bones, duration of functioning, seasonality

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S15-A: Hypogéisme funéraire en Europe et en Afrique

Tradition and memory. Use and reuse of the hypogea in the Recent Prehistory of the West Mediterranean islands

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In some Western Mediterranean islands, the use of funerary hypogea during the Bronze Age and Early Iron Age is a phenomenon that has been often underestimated. In fact, in Recent Prehistory, the occurrence of use and reuse hypogea is not attenuated but rather renewed even with particular and distinct forms compared to those of the earliest prehistory.
In the context of hypogeal monuments, distinctive indicators of chronology can be peculiar planimetry and also representations of architectural details, or/and symbolic and artistic elements. In other cases, the most difficult to distinguish, it is only the archaeological context that can connote the use in a given period, so without an excavation survey, such cases remain almost impossible to determine.

The question of establishing the chronology of monuments -due to the frequent perspective of *longue durée* that characterizes them- is a difficult problem to solve. For the different areas, the importance to determine the features that connect hypogea to recent prehistory influences our capability to understand important cultural aspects of ancient societies.
The option of using hypogea at the same time as other more widespread tomb types, as is in Sardinia the collective megalithic tombs, presupposes complex dynamics that can be related to forms of social differentiation or ideologies strongly anchored to the cult of ancestors and the memory of the past.

Mots-Clés: hypogea, Recent Prehistory, Mediterranean Islands, cult, ancestors

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Rethinking the "Hypogeic Paradox" in the Aegean area during the 4th and early 3rd Millennia BC

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Despite the wider evidence of rock-cut tombs in the central-western Mediterranean, the Aegean area, including insular region and Mainland Greece, continues to be perceived as a border region and marginally involved by the vast funerary hypogeism phenomenon.
Since the first researches of the Greek Prehistory, the scarce evidence, mostly limited to Attica and the Cyclades, has focused on the origin of this funerary model which has been traced unilaterally to external contributions from the eastern Mediterranean. In the last two decades new evidence has radically modified the previous framework in terms of spatial distribution and especially in the perspective of the chronological sequence, thanks to the convergence between radiometric dates and the explorations of new large funerary sites throughout most advanced methodologies.

The present work seeks to review and to update the validity of models that have proposed in a primary multidisciplinary research (Cultraro 2000), mostly addressed to define the distribution map and the chronological differences of the funerary hypogeic phenomenon in the circum-Aegean area since the Late Neolithic Period. Recent and partially published data coming from the northern coastline of Peloponnese, mostly from Elis and Achaia, invite to reassess the main questions related to the introduction, diffusion and decline of the rock-cut tomb model in the Aegean during the 4th millennium BC .
The paper focuses on the relationships between the emergence of this funerary typology and the possible external stimuli coming from the South-western Balkans and Mainland Italy. Moreover, the analysis involves the architectural features (small chamber and vertical entrance), as well as the main burial aspects (secondary inhumation, bones manipulation and selective burial assemblages).Finally, a further investigation is addressed to examine the emergence of a different hypogeic building model, mostly in Attica district, which has been used for multiple purposes. The close relations with the metallurgical activity confirms the adaptation of the hypogeic architecture in a field which is alternative to the funerary context.

Mots-Clés: Aegean, Hypogeism phenomenon, rock, cut tombs, Late Neolithic, Early Helladic, Diffusionism models

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LA POPULATION PREHISTORIQUE DE LA REGION DE BISARCIO (OZIERI, SASSARI, SARDAIGNE). NECROPOLE HYPOGEE ET TRACES D'HABITATS.

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La région de Bisarcio est localisée entre une zone collinaire et la plaine alluvional qui se étende jusque à la rive gauche du rio Mannu, où est située la basilique médieval de Bisarcio.

Pendant des esplorations archaeologiques ont a trouvées grottes funeraires artificiels isolées et nécropoles, monuments mégalithiques et matériaux préhistoriques en silex, obsidienne, bone, documentant un grand peuplement de la région dans la préhistoire.

La recherche analyse les aspects structurels, fonctionnels et rituels des monuments et des matériaux et les rélations entre le monde des vivants et des morts, au fin de trouver l'origine et la cronologie du process insediative dans la région où course de la préhistoire.

IL POPOLAMENTO PREISTORICO NELLA REGIONE DI BISARCIO (OZIERI, SASSARI, SARDEGNA). NECROPOLI IPOGEICHE E TRACCE DI INSEDIAMENTI.

Paola Basoli

Archeologa, Soprintendenza archeologica di Sassari

Riassunto

La regione di Bisarcio è compresa tra una zona collinare e la pianura alluvionale che si estende fino alla riva sinistra del rio Mannu, dove è situata la basilica romanica di Sant'Antioco pertinente al villaggio medievale di Bisarcio.

Nel corso di lavori di censimento archeologico sono stati rinvenuti ipogei isolati e necropoli, monu menti megalitici e materiali preistorici in selce, ossidiana, materia dura animale e ceramica, che documentano un intenso popolamento della regione nella preistoria.

La ricerca intende analizzare gli aspetti strutturali, funzionali e rituali dei monumenti e dei

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materiali e le relazioni tra il mondo dei vivi e dei morti, al fine di individuare l'origine e il processo di sviluppo insediativo e cronologico nella regione nel corso della preistoria.

Mots-Clés: Grotte funéraire, Chronologie, Rituel, Monde des vivants, Mégalithisme.

NEOLITHIC HYPOGEISM AND ITS FIGURATIVE EXPRESSIONS: THE SARDINIAN DOMUS DE JANAS AND THE MALTESE HYPOGEA

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A comparative analysis of the commonalities and divergences between the impressive Neolithic rock-cut underground funerary structures of the two Mediterranean islands, the *domus de janas* of Sardinia and the two hypogea of the Maltese archipelago: their chronology, their plans and shapes, their relief and/or painted decoration, their purpose and function. The comparative analysis will be extended to the associated finds, mainly, the plastic figurative representations. This will be followed by a discussion relating to the possibility, or otherwise, of influence exerted by one of the two cultures on the other.

Mots-Clés: Sardinia, Malta, Domus de janas, Funerary hypogea, Figurative art

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TOMBES DE GEANTS CREUSÉES DANS LA ROCHE : UN NOUVEAU TEMOIGNAGE

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This contribute focuses on the theme of tomb class of the so-called "architectonic prospect domus", just over a hundred specimens : rock-cut version of the Bronze Age tombs of giants, spread exclusively in the North-West of Sardinia area, where megalithism is unable to replace neolithic hypogeism.
A new tomb as recently been identified and is currently being surveyed. It differs from other tombs for some significant characteristics. This is the southernmost within the area, extremely peripheral but still close to the architectural model of the type. It also features the reproduction of the entire external mound, extremely unusual in other tombs; in the room there is also a very rare cavity in the center of the floor, heir to the tradition of the Neolithic "domus de janas".

TOMBE DI GIGANTI SCOLPITE NELLA ROCCIA: UNA NUOVA TESTIMONIANZA

Riassunto

Il contributo si incentra sulle "domus a prospetto architettonico" note in poco più di cento esemplari: si tratta della versione ipogeica delle tombe di giganti dell'Età del Bronzo, diffusa esclusivamente nel Nord-Ovest della Sardegna, areale dove il megalitismo funerario non riesce a sostituirsi all'ipogeismo neolitico, eccezionalmente radicato.

Una nuova tomba è stata recentemente individuata ed è attualmente in corso di rilievo, si distingue dalle altre tombe per alcune significative caratteristiche. La tomba è la più meridionale all'interno dell'areale, estremamente periferica ma ancora fedele al modello architettonico del tipo. Presenta inoltre la riproduzione dell'intero tumulo esterno, estremamente inconsueta nelle altre tombe; nella camera è inoltre presente una rarissima fossetta al centro del pavimento, erede della tradizione delle domus de janas neolitiche.

Mots-Clés: Sardinia, Hypogeis, " Tomba a prospetto ", Ttumulus.

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RELATIONS BETWEEN HYPOGEISM AND MEGALITHISM IN PREHISTORIC SARDINIA

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During the Late Neolithic and Copper Age in Sardinia (Italy) two cultural phenomena of great importance develop simultaneously: hypogeism and megalithism. The relationship between these two phenomena has been the subject of international debate, even recently. The two cultural expressions, in fact, are both present in the prehistoric horizon of the Mediterranean, especially in the Iberian Peninsula but also in France. On the island of Sardinia, we record, in the same chronological phase, the presence of two kinds of graves: rock-cut tombs – called domus de janas (remarkably more common) – and dolmens. The two monuments are built and used by the same populations, often in the same areas, with cases of locational associations and forms of structural integration. What needs to be understood is why both burial types were used and why either monument was preferred in different instances. This contribute aims to make the point on the situation and to propose possible hypotheses in order to explain the phenomenon. It seems however preferable to view dolmens as 'territorial markers', while domus de janas are more linked to villages and areas of resource exploitation.

Mots-Clés: Hypogeism, Megalithism, Sardinia, Rock, cut tombs, Dolmens.

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BRONZE AGE HYPOGEAN CHAMBER TOMBS IN CENTRAL ITALY

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In central Italy the funerary sphere of the Chalcolithic age (until 2300 aev) was well known from the first half of the 20th century. For the subsequent Early, Middle and Recent Bronze Age (2300-1200) the burials remained unknown until 1990, while in the Final Bronze Age (about 1175-950) the funerary aspect with cremations treatment has been archaeologically evident since the 19th century (although the burials were initially attributed to the Early Iron Age) .

For the Recent Bronze Age the turning point was given by the discovery in 1980 of the burial ground of Cavallo Morto (Anzio), then of few tombs at Matelica (Regione Marche), and of a third group at Lucus Feroniae not far from Rome.

Only in 1990, working and discussing with Renato Peroni, I argued that the chamber tomb of Luni sul Mignone and others in the same area were referable with this ghost-period of the Early and Middle Bronze Age. The later excavations of the robbed chamber of Prato di Frabulino near Farnese (1992) confirmed this suspect.

The hypogeical tombs of the transition from the Ancient Bronze Age to the Middle Bronze Age and of the full Middle Bronze Age are concentrated in the Farnese-Ischia di Castro and Barbarano-Blera areas, and the models are not very different from those of southern Italy, while in the North now begins the rite of the urnfields.

It is very difficult to understand the reasons for the exclusive geographical concentration of the Bronze Age chamber tombs in the two areas of Farnese-Ischia di Castro and Barbarano Romano-Blera.

On the one hand, it can be thought that the presence of two geographical groupings of maximum attestation of the monuments and a few doubtful units outside reflect a complex ancient reality.

On the other hand, as this concentrations seems anti-historical, it is perhaps necessary to give greater weight to finds such as those of Piansano and Sutri (respectively funerary vases of this period found in building excavations and not-official news of tombs with pre-Etruscan shards) and perhaps also to the old drawings of Tarquinia-Ripagretta, waiting for the archaeological documentation to demonstrate a greater diffusion, in the territory of the future Etruria, of this category of underground tombs.

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The latest discovery, that occurred at Civitella Cesi, is very different and contributes to complicate the overview because the existence of dolmens in Etruria - denied for Etruscan specimens erroneously attributed to the Middle Bronze Age - restarts from the presence of a dolmen made with the unknown technique of cutting tufa slabs.

Mots-Clés: Artificial hipogeum, Chamber tomb, Dolmen, Etruria protohistory

LA NÉCROPOLE DE CABAZZA (SENNORI)

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Résumé

La nécropole de Cabazza est située à la limite nord-est de la commune de Sennori, sur le relief calcaire homonyme qui délimite par un système de terrasses un tronçon nord de la vallée fluviale traversée par le Riu Pedras de Fogu. Neuf grottes artificielles de type domus de janas ont été identifiées dans la zone, divisées en deux groupes: la première, composée de trois sépultures, est située sur le versant sud du relief; la seconde, plus nombreuse, est composée de six tombes ouvertes en séquence le long du côté nord-est.

La plupart des sépultures sont dans un très mauvais état de conservation, principalement dû à l'action d'agents exogènes qui altèrent constamment le calcaire friable. Certaines sépultures se distinguent cependant par une meilleure conservation de l'intérieur: c'est le cas des tombes IV, V et VI. Celles-ci, les plus monumentales de la nécropole, comportent la présence plusieurs salles, jusqu'à huit, parfois très grandes. La présence d'éléments décoratifs que l'on peut observer sur deux portes des tombes IV et VI est particulièrement intéressante: il s'agit de larges corniches en relief qui marginalisent les entrées des chambres secondaires. La porte décorée de la tombe VI se caractérise aussi par la présence, dans la partie supérieure de la corniche, de deux rangées de triangles gravés. Ce motif, documenté dans plusieurs domus de janas, comme dans la tombe IV de Matteatu-Alghero ou dans celle de S'acqua Salida-Pimentel, apparaît dans la nécropole de Cabaza avec la syntaxe inhabituelle des triangles réitérée au-dessus de la porte.

La découverte dans certaines tombes de matériaux céramiques attribuables au *facies* du Monte Claro et celui de Sa Turricula, documente comment la nécropole, fouillée pendant le Néolithique récent et final par les peuples de culture d'Ozieri, a été réutilisée par la suite au cours de l'Enéolithique et au début de l'âge du bronze

LA NECROPOLI DI CABAZZA (SENNORI)

Riassunto

La necropoli di Cabazza è ubicata nel limite nord-orientale del comune di Sennori, sull'omonimo rilievo calcareo che delimita, attraverso un sistema terrazzato un tratto settentrionale della valle fluviale percorsa dal Riu Pedras de Fogu. Nell'area sono state individuate nove grotticelle artificiali del tipo a domus de janas suddivise in due gruppi: il primo, costituito da tre sepolture, è ubicato sul versante meridionale del rilievo; il secondo, più numeroso, è formato da sei tombe

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aperte in sequenza lungo il versante nord-est.

La maggior parte delle sepolture versano in pessimo stato di conservazione, causato prevalentemente dall'azione degli agenti esogeni che costantemente alterano il friabile calcare. Alcune sepolture si distinguono, tuttavia, per una migliore conservazione degli ambienti interni: è il caso delle tombe IV, V e VI. Queste, le più monumentali della necropoli, presentano diversi vani, fino a otto, in alcuni casi molto vasti. Di particolare interesse è la presenza di elementi decorativi osservabili su due portelli delle tombe IV e VI: si tratta di ampie cornici in rilievo che marginano gli ingressi a celle secondarie. Il portello decorato della Tomba VI si caratterizza ulteriormente per la presenza, nella parte superiore della cornice, di due file di triangoli incisi. Questo motivo, documentato in diverse domus de janas, come ad esempio nella Tomba IV di Matteatu-Alghero o in quella di S'acqua Salida-Pimentel, si presenta nella necropoli di Cabaza con l'inedita sintassi dei triangoli reiterati al di sopra del portello.

Il ritrovamento in alcune sepolture di materiali ceramici ascrivibili alla *facies* di Monte Claro e a quella di Sa Turricula, documentano come la necropoli, scavata durante il Neolitico recente e finale dalle genti di cultura di Ozieri, sia stata successivamente riutilizzata durante l'Eneolitico e nelle fasi iniziali dell'Età del Bronzo.

Mots-Clés: Sardaigne, Domus de janas, Néolithique, Hypogéisme, Cabazza.

ROCK-CUT FUNERARY ARCHITECTURE AND THE SHAPING OF PREHISTORIC LANDSCAPES IN SICILY

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Abstract

Rock-cut architecture is a crucial constitutive element of the present-day landscape of Sicily. The diffused presence of steep limestone, sandstone, and flysch outcrops characterises a large part of the island: because of their geomorphological structure, human intervention contributed to modifying most of these outcrops. From prehistory up to very recently, these geological features have been extensively exploited through very simple technologies, producing in this way a vast heritage of 'negative' architectures. Artificial cavities have been used as prehistoric burials and, in the following periods, as defence or cult places, spaces for crafts and agricultural productions, housing structures. Their analysis is partly hindered by the difficulty to date accurately these structures. Because of their prolonged use, often these cavities are found without any clear evidence of their original deposits. As said, the technology used for their excavation has been very simple and conservative through the centuries. A GIS-based research project aimed to catalogue, plot, and date the numerous Sicilian rock-cut evidence recently started targeted to overcome these hindrances. A preliminary overview of the project will be presented in the contribution, while the remaining part of the paper will focus on the long-term development of rock-cut prehistoric funerary architecture. In Sicily, hypogeic burials have been in use from the Copper Age. In the previous phases, clear evidence for funerary habits dates to the Upper Palaeolithic and the Mesolithic periods. In the Neolithic, this evidence is extremely scarce, with only a few pit burials exposed in eastern Sicily dating to the Late Neolithic Diana phase. The hypogeic tradition started in Sicily in the Early Copper Age at the end of the 5th millennium BC, with the spread in Western and Southern Sicily of shaft graves where single or double inhumations were deposited together with grave goods composed mainly by incised San Cono-Piano Notaro pottery. It is only at the end of this period (late 3rd millennium BC) that rock-cut graves characterise the whole island. Cemeteries show strict spatial proximity with the villages to emphasise the close relationship that at this stage linked the world of the living with death, as at Roccazzo or Tornambè. A change in funerary rituals also accompanies the passage from shaft to "*grotticella*" tombs. There is now the predominance of collective burials, often marked by secondary depositions, and the appearance of metal objects and personal ornaments in the grave goods. Since the Early Bronze Age and throughout the 2nd millennium BC, the architectural funerary structures remained unvaried, with only a more complex external and internal space organisation. The burials are also accompanied by a progressive rise of grave goods complexity, using exotic prestige items and metal objects. From the Early Bronze Age, there is a progressive separation of the living/dead spheres. The necropoleis are bigger and organised on a more

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extensive territorial range, often placed along the rocky ridges above the villages. This process also continued in the following phases to reach its apex with the monumental necropolis of Late Bronze Age and Early Iron Age, such as Pantalica, with thousands of graves. The contribution will conclude with some preliminary considerations about the cultural, ritual, and economic role of rock-cut architecture for the constitution of prehistoric Sicilian landscapes.

Mots-Clés: Sicil, rock, cut architecture, prehistoric burials, landscape, GIS

SOME REFLECTIONS ON HYPOGEISM FUNERAIRE EN ITALIE

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Depuis le Congrès de Sassari du 1994 beaucoup de nouvelles fouilles ont augmenté nos connaissances sur l'hypogéisme dans la péninsule italienne, surtout en ce qui concerne les régions centrales et méridionales.
Dans les plaines du nord d'Italie et dans quelques autres zones on connait les sépultures en fosse, tandis que, le long de la chaîne des Apennins, surtout en Ligurie et en Toscane, les sépultures sont dans des grottes ou dans des abris. C'est en particulier dans la Toscane méridionale, le Latium, la Campanie, les Pouilles et la Basilicate, que dominent les hypogées creusés dans les roches tendres, telles celles d'origine volcanique du Latium et de Campanie.

L'hypogéisme en Italie péninsulaire a son origine déjà au cours du Néolithique récent et final (cultures de Serra d'Alto et de Diana) avec les grands hypogées de la zone de Pouilles près de Bari (Hypogée Manfredi en particulier et des autres très grandes découverts dans les dernières années), datés de 3600-3000 BC, mais des phénomènes liés à l'hypogéisme sont aussi dans les sépultures en silos ou en petites grottes artificielles, toujours pendant les cultures de Serra d'Alto et de Diana, soit dans le Pouilles, soit en Basilicata.

L'hypogéisme se développe ensuite au cours de l'âge du Cuivre (IV- III millénaire BC) avec les nombreuses nécropoles de tombes en grottes artificielles utilisées pour des sépultures multiples, avec des offrandes de vases, d'armes en pierre ou en cuivre et de colliers, et même avec des offrandes animales (chiens, brebis, porcs).

Des nécropoles importantes ont été découvertes dans la Toscane méridionale, à la limite avec le Latium (Vallée du Fleuve Fiora) et ont donné beaucoup d'informations sur le rituel, l'anthropologie, les datations et les rapports avec le territoire, riche en mine de cuivre.

Informations très importantes proviennent aussi de la banlieue de Rome, où les fouilles extensives ont découvert non seulement les nécropoles mais aussi les habitats. Dans ces sites, comme dans de autres, on a pu constater la présence contemporaine des cultures de Rinaldone, Laterza, Gaudo, Ortucchio, témoignant donc la richesse et l'ampleur des contacts entre les diverse régions.

Le même phénomène a été constaté en Campanie, où, dans la zone de Naples, nombreuses nécropoles sont associés à des villages ; des autres sont présentes dans toute la région, comme dans les Pouilles, en Basilicate et en Sicile.

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L'hypogéisme dans la péninsule italienne continue pendant l'âge du Bronze, avec des tombes princières et monumentales, connues surtout dans les Pouilles près de Foggia et en Basilicate et présentes même dans le Latium du Nord.

Mots-Clés: Hypogeisme, Italie, Péninsule, Development, Chronologie.

CREUSER DANS LE ROC : DE LA GROTTE NATURELLE A LA CAVITE ARTIFICIELLE: CAS DES HYPOGEES DE LA TUNISIE SEPTENTRIONALE.

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Partant d'une longue expérience de forte occupation des abris sous roche et des grottes naturels durant le Néolithique en Tunisie, les hypogées voient le jour durant les périodes ultérieures comme lieu d'enterrement des morts. Les hauts massifs calcaires, nombreux en Tunisie septentrionale, offrent le support parfait pour ce type de monuments. Nous reprenons dans ce travail, quelques monuments funéraires dits en Tunisie et en Algérie " Haouanet " (pl. de hanout, boutique), nommés aussi en arabe " Ghrof " ou " Ghrifet " (chambres) ou encore " biban " (portes). Ces cavités creusées dans les rochers forment de petites grottes artificielles cubiques ou parallélépipédiques ne dépassant que très rarement les 2 mètres de côtés. Elles peuvent être simples ou à chambres complexes disposées en enfilade et qui conservent encore des attraits architecturaux et quelques caractéristiques architectoniques, décoratives et symboliques. Un essai de comparaison avec leurs semblables du bassin méditerranéen sera tenté.

Mots-Clés: Creuser, Diffusion, Typologie, Chronologie, Décors.

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The dawn of the funerary hypogea in Neolithic Sardinia, reconsidered

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For a long time, the early and sudden appearance of the artificial hypogea in prehistoric Sardinia has been considered among the innovative characteristics of this island in the wider Western Mediterranean basin. In this paper I will discuss the problem of the origins of the funerary behavior linked to the introduction of carved chamber graves in Middle Neolithic Sardinia, in the light of the most updated archaeological evidence. Traditionally, this topic has been approached more on the ground of the typological evolution of both the ritual and the funerary structures, than about the correlated socio-economic meaning involved in this innovation. The first appearance of the concept of necropolis will be placed here in the frame of the process of Sardinia neolithization, which in turn is linked to the origin and growing of social wealth and inequality. All the available data (chronological, ritual, and contextual) will be considered and treated by a diachronic perspective. According to the symbolic value of the grave set from the few published and affordable excavations, the discontinuity and reappraisal of the hypogea in late Neolithic funerary tradition of Sardinia will get a more extended discussion. This high variability of symbolic and coactive practices is considered and evaluated in the background of the increasing interregional connections that concerned the advanced farming societies of the island and that caused the introduction of innovative and sometimes ephemeral practices.

Mots-Clés: funerary hypogea, Neolithic, Sardinia

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FUNERARY RITUALS INSIDE CAVES DURING THE ENEOLITHIC AND THE BRONZE AGE IN CENTRAL TYRRHENIAN ITALY: THE CASE STUDY OF THE TUSCAN-LAZIAN MAREMMA

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This communication examines the several caves used for funerary purposes in the chronological range between the Eneolithic and the Bronze Age in Tuscan-Lazian Maremma. The natural cavities that contain human remains are 26. Among these, 21 are located in Tuscany, mainly in the area of Colline Metallifere and in the Grosseto area, and 5 in Latium, concentrated along the left bank of Fiora river. The caves used for funerary purposes are characterized by large spaces, simple galleries and/or overlapping chambers and natural clefts. The funerary ritual that is attested includes the inhumation and the creation of collective burials, as it is demonstrated by absolute datings. Collective burials are characterized by the diachronic deposition of multiple individuals in subsequent times, hence structures are clearly reopened in order to place new corpses or human remains.
On the basis of the available literature, the aim is to provide an overall view of the demographic composition, the ratio between primary and secondary burials, and the representation of each skeletal element. In fact, this last analysis may highlight anomalous concentrations of one or more skeletal districts, with the opportunity to point out the eventual intentional selection of the bones to be buried or particular displacements during which some elements could have been lost.

Mots-Clés: Caves, Eneolithic, Bronze age, Funerary, Italy.

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FUNERARY HYPOGEISM IN SOUTHERN ETRURIA: CULTURAL CHANGES BETWEEN THE ENEOLITHIC AND THE MIDDLE BRONZE AGE

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Between the Eneolithic and the Middle Bronze Age, in Southern Etruria several different funerary hypogean structures and many funerary rituals reflect changes in society.
The funerary ritual attested during the Eneolithic period is attributable to the Rinaldone culture that is characterized by single and multiple burials inside rock cut tombs with a typical structure made of a chamber and a well entrance (*tombe a grotticella artificiale*). Necropolises are distributed between Northern Latium and Southern Tuscany, but in the territories between the Fiora and Albegna rivers a high concentration of necropolises organized by groups more or less close to each other, whose distance varies from 1 to 5 kilometers, is present. This area is defined "nuclear area".

With the passage to Bronze Age in the middle Fiora river valley a drastic reduction of funerary evidences can be noticed. This situation is also reflected in the lack of settlements. In fact, given the current state of research, if we exclude surface materials, settlements remains and caves frequentations are poor during this phase.

During the Middle Bronze Age two important funerary phenomena are attested: the first one is the birth of the monumental chamber tombs with a dromos of access (Roccoia, Prato di Fabulino, Civita di Musarna and in the territory of Blera), clearly designed for high ranking members, that seem to appear in the region at this time; the second one is the use of caves and natural cavities as cemeteries (Grotta Misa, Felcetone, and Grotta Di Carli) that refers to the Eneolithic tradition of burials inside natural cavities that are attested throughout the rest of the Italian Peninsula.

Mots-Clés: Tombs, Eneolithic, Bronze Age, Funerary, Italy.

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DOMUS DE JANAS XIII DI CANNAS DI SOTTO

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Le domus de janas de Cannas di sotto est située à l'intérieur de la périphérie est de Carbonia, dans le sud de la Sardaigne. Il y a 26 hypogées de différents types creusés sur une modeste colline calcaire. Parmi ceux-ci, la Surintendance fait de recherches dans la tombe XII (2016 et 2018). Cela a fourni de nouvelles importantes pour l'étude de certaines questions centrales sur l'étude du phénomène de l'hypogéisme en Sardaigne. La très grande période de fréquentation (entre le Néolithique et le Chalcolithique) correspond à la continuité d'utilisation de nombreuses domus de janas, mais c'est la phase initiale d'utilisation qui est d'intérêt. En fait, les matériaux trouvés dans les fouilles archéologiques permettent de dater le domus de janas dans la phase appelée San Ciriaco, qui surgit entre le Néolithique moyen sarde (culture Bonuighinu) et la culture Ozieri, à laquelle le phénomène avait été précédemment attribué. Outre le problème chronologique, la découverte de trois statuettes féminines à l'intérieur de l'hypogée est utile pour comprendre la signification des figurines anthropomorphes et leur rapport avec le monde funéraire. Dans cet article, on propose des réflexions générales sur ces deux aspects du Néolithique sarde grâce à ces nouvelles découvertes.

Mots-Clés: Hypogeisme, Domus de janas, Néolithique, Figurines féminines, Sèpultures collectives.

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IPOGEI NEOLITICI ARTIFICIALI DI SANTA BARBARA, POLIGNANO A MARE, PUGLIA, ITALIA

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The Santa Barbara neolitihic settlement (Polignano a Mare, Puglia, Italy) is known for the presence of an entrenched inhabited and of underground structures as Manfredi hypogeum which is datable between 4100 and 3600 b.C. inner the meander-spiralic culture.
The creation of this hipogeic complex manipulate in part the disused more ancient ditches: this is confirmed by their own filling and also by typology of the materials contained therein that are different from those that are collected in the deposits located inside the hypogea. This underground structures have no utilitarian use except for some cases where the functional origin is still legible. Often these are locations suitable for the deposition of material (pottery, personal items, horn, deer antlers) and probably also immaterial offers. Therefore a dense set of caves very articulated that is characterized by artificially excavated structures with characteristic bipartite plant which standardizes especially in numerous hypogea placed on internal margins of the ditches located on the sides NW S and SE of the settlement. The bilobed plant that we can define canonical starting from the middle of IV millennium b.C., however it seems to be not the only type of architecture to characterize these beautiful neolithic monuments. The latest research in the Galluzzi area, already frequented by the end of the VI millennium b.C., in fact reveals the presence of complex structures because they involve different aspects between everyday life and non-utilitarian ones.

Underground setting, divided into three independent units, alternate with structures used for water conservation.

Among these the most investigated is the hypogeum F.

The underground structure opens on the front of a natural terrace at the base of which, as already seen, run two sections of ditch.

It appears as a slightly bilobed single-celled structure derived from the remodeling of pre-meander-spilaric underground structures (probably other cisterns), located on the perimeter of the ditches and functional to the housing area on the plateau.

The structure has two entrances, almost diametrically opposite open respectively to the E and NE: two entrances almost certainly made in different phases. Of these, the most recent one

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corresponds to the smaller entrance with access *dromos* on the inclined plane with steps in relief on the plane.

The investigations of the internal deposit exposed a funerary level that concluded the frequentation of the cavity. This level was characterized by a necropolis with crouched burials and partial depositions consisting mainly of large cranial portions and mandibles (referable to at least ten individuals) arranged along the perimeter of the internal walls of the cell.

The depositions were not accompanied by grave goods except in two cases.

The funerary layer, which would correspond to a not too advanced moment of the meander-spiralic *facies*, is preceded by a moment of abandonment of the artificial cavity that separates it from a phase in which it was used for different purposes. Aspects concerning paleonutrition and genetics are being analyzed.

Mots-Clés: Santa Barbara, Polignano a Mare (Italy), Apulia Neolithic, Artificial Hypogea, Funerary, Meander, spiral culture.

ORIGINE, DÉVELOPPEMENT ET CONCLUSION DE L'HYPOGÉISME FUNÉRAIRE EN SARDAIGNE

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Une synthèse mis à jour sera présenté sur certains problèmes liés à l'origine, au développement et aux résultats finaux de l'hypogéisme funéraire en Sardaigne, attesté par les grottes creusées dans la roche ou les tombes à chambre, localement appelées "domus de janas", attribuées à la culture Ozieri (IV millénaire avant JC). Environ 3 500 d'entre eux sont connus, répartis sur toute l'île, avec une concentration significative dans le centre-nord de la Sardaigne. Au moins 215 d'entre eux (6,2%) apparaissent décorés de motifs sculptés en bas-relief, gravés ou peints, presque uniques dans le contexte euro-méditerranéen, à la seule exception de l'hypogée funéraire de Hal Saflieni, à Malte.
Le problème de l'origine du modèle funéraire a été à nouveau abordé, en tenant compte des nouvelles découvertes et des études récentes qui ont conduit à une étude approfondie de la séquence culturelle de la Préhistoire sarde. Il semble maintenant établi que l'origine de la culture Ozieri est locale et a ses racines dans la culture de San Ciriaco, aujourd'hui reconstruite sur la base de certaines preuves archéologiques, qui à son tour, semble être une émanation de la culture Bonuighinu. Le modèle funéraire de la tombe creuseée, présent depuis cette dernière culture, est attesté dans la culture suivante de San Ciriaco et se développe avec variété et richesse de typologies planimétriques dans les *facies* Ozieri I et II et pendant l'âge du cuivre, avec des influences claires du mégalithisme sarde.

La conclusion du phénomène hypogéen semble avoir eu lieu à l'âge du bronze et est attestée par des matériaux et des monuments. Ces dernières preuves archéologiques incluent la tombe de Su Campu Lontanu à Florinas, véritable *allée couverte* creusée dans un bloc rocheux, résultat de la rénovation d'une domus de janas.

Mots-Clés: Origine, Développement, Résultats finaux, Chronologie, Allée couverte.

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MATHEMATICAL TOOLS FOR DATING AND DOCUMENTATION IN ARCHAEOLOGICAL SCIENCE: SERIATION AND PHOTOMETRIC STEREO SHAPE RECONSTRUCTION

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Two important aims of the archaeological investigation are to date excavation sites on the basis of found objects for determining their relative chronology, and to construct virtual reconstructions of rock art engravings or bas-reliefs.
A mathematical approach to the first issue is the seriation problem, formalized for the first time by Petrie in 1899. A modern formulation for the problem consists of associating a bipartite graph to a set of types and units, e.g., found artifacts and excavation sites. The graph is then analyzed to determine a chronological ordering of the locations under the assumption that the types were produced, or "fashionable", only for a limited period of time. We will outline a spectral method for solving the seriation problem and present some results obtained by a software implementation of the algorithm.

Photometric stereo is a Computer Vision technique that allows recovering the 3D shape of a bas-relief surface from a set of digital pictures taken under different lighting conditions. This technique reconstructs both the shape and the so-called albedo of the surface, that is, its color and texture, and allows the observer to separate one from the other. Data acquisition can be performed by standard photographic equipment, and real-time data processing only requires a laptop computer, thanks to an optimized algorithm. Reconstructions deriving from synthetic and experimental data sets will be displayed.

Mots-Clés: Seriation, Photometric stereo, Dating, Virtual Shape Reconstruction.

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Grotta del Romito (Calabria, South Italy): funerary rite in a cave, symbolic burials, organization of space in late Paleolithic contexts

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Grotta del Romito is one of the most significant Paleolithic evidences in Italy, well known to the scientific community for the researches of the University of Florence, begun in the 960s by Paolo Graziosi and then continued from the year 2000. The site is identified above all with the majestic engraving of *Bos primigenius*, but its evidences, defined by multidisciplinary research, have allowed a climatic and environmental reconstruction, production trends, economic assets starting from 24,000 years ago up to the Neolithic, with a more significant and in-depth definition for the upper Paleolithic. The funerary contexts found on the site, with nine individuals, offer an important contribution to the definition of the Epigravettian funeral rite. They are accompanied by small sunken structures containing few and selected objects, which broaden the symbolic profile. The cave thus becomes a place where the excavation of cavities (funeral pits, dimples) takes on a symbolic value as a memory space, the location of which in the site is inserted according to a non-random spatial code. The authors present a series of reflections with which an evaluation is proposed that correlates the individual evidences in a unitary vision.

Mots-Clés: Grotta del Romito, Calabria, funerary rite, symbolic burials, organization of space, late Paleolithic

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S18-B:Lower Palaeolithic across time and space : what we are talking about?

Double Patina and the Acheulian Longue Durée: Collecting and Modifying Patinated Flaked Items during the Lower Palaeolithic

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The surfaces of flint items are subjected to various chemical alterations over time and under certain environmental conditions. These chemical alterations often defined in research as "patination". While scholars tend to distinguish between various types of patina, all are discerned from "fresh" flint surfaces by differences in colors, gloss and textures. Some well-developed patinas can even be distinguished solely by the naked eye. Amongst the different studies associated with flint patination, "double patina" is used as an evidence for lithic recycling. Recycling, in this case, is a behavior that implies the employment of an existing "old" artifact and its further modification for a new use-phase. Hence, using patinated flaked items as workable materials is a clear example of recycling since the new phase of modification can be clearly and easily differentiated from the older patinated flaked surface. Moreover, the presence of patina on the original flaked surfaces implies for a gap in time between the original production (and possible use) of the original (now patinated) item, and its post-patina collection and modification.
Recently, the phenomenon of double patina was systematically studied at two Lower Palaeolithic sites in Israel: The Late Acheulian open-air sites of Jaljulia and Revadim Quarry. Here, an attempt is made to present the phenomenon of "double patina" and its role in the general lithic procurement and lithic recycling behaviors practiced at those sites, arguing for a possible new behavioral pattern that was not recognized yet.
The results lead us to suggest that the act of recycling was not conducted due to shortage in lithic materials (as both sites still comprise of more lithic items made out of fresh flint, and since their surroundings are rich in flint sources), but rather due to behavioral choices which seem to span throughout the Lower Palaeolithic and beyond; in time and space. Furthermore, it appears that the collection of "older" patinated items for recycling was purposeful and specific, as "old" patinated cores and blanks with specific desired proprieties (e.g., morphology and size) were chosen and collected. We will suggest that the collection and modification might have been a pan-Acheulian behavioral trait that could reflect both practical and perceptual characteristics of the Acheulian.

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Mots-Clés: Double Patina, Acheulian, Lower Palaeolithic

Mass Distribution of Spheroids and their Relation to Aesthetic Taste

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The importance of throwing in early hominins is discussed and how a trained visual selection of suitable throwing material leads to a mass distribution of a Poisson type, as found in manuports, spheroids and is even reflected in modern packaging. A clear notion of form - or aesthetic taste as defined by Kant – can be seen by the Middle Pleistocene, as in the collection of colorful flint pebbles at Qesem Cave, Israel, the use of mathematical constants in the Boxgrove (UK) "hand axe" formats, a contemporary case from Fontana Ranuccio, and the much earlier spheroid designs of Ain Hanech. There is the possibility that spheroids were made as "perfected" throwing tools, given that the maximum mass for a linear dimension is the sphere, a characteristic certainly perceived by early hominins and the mass distributions of available examples are similar to that of the cache of natural spheroids at Cave of Hearths (South Africa). However, certain smaller spheroids are significantly lighter and more suitable for children to practice throwing. The importance of play-learning and how this would appear in any lithic record has been largely overlooked and is discussed in terms of expected mass distribution. Other play aspects of spheroids which may also have attracted hominin attention are mentioned and how evidence of this could be seen in the archaeology. Despite the huge time differences between spheroid deposits (for example; Ain Hanech and Barranco Leon), the case is made that the mass distribution of male selected rocks has been relatively constant for at least 2 Ma and given the size of the Laetoli hominins, possibly for much longer. Spheroid manufacture, if dominated by the desire to concentrate a specific mass in a pleasing form, may thus have a common and underlying mass distribution; hence, a data base of all spheroids could allow for a comparison between site locations and over time. The Cave of Hearth's natural spheroid assemblage, for example, suggests that the rocks were collected by large males (average 180 cm), which matches the known fossil record. As all and any spheroid or roughly shaped stone with amss of 400 to 600 g represents good throwing material it would be of great value if the scientific community would present all data on spheroids, manuports, cores, battered stones, etc. as full mass distributions (which could convey much information) and not just mean and standard deviation values (which tell us very little) and to put any spheroids in the context of the full lithic assemblage. If a spheroid can be seen as an improved throwing stone, its precursor would likely be a cache of selected manuports with a similar mass distribution – possibly even in a pre-artefact age. This would be the only possible lithic evidence of hominin behaviour from this period.

Mots-Clés: spheroids, manupoorts, data base, throwing, play, learning

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An Early Stone Age In West Africa? Polyhedrons and Spheroids at Ounjougou, Mali

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Ounjougou stratigraphic sequence is the most complete record in Western Africa for the Middle Pleistocene. This paper focuses on the lithic industry unearthed in the lowest levels of the sequence. Despite the impossibility to fix the dating of those layers, the assemblage clearly presents Oldowan features. A strong erosive process, combined to the absence of Acheulean industry, strengthens the idea of a probable ancient age for the lithic industry. The technological and techno-functional approach performed to study polyhedrons, spheroids and bolas, abundant in the collection, demonstrates that those artefacts were shaped from independent *chaînes opératoires* to realize specific tasks. The hypothesis of opportunistic *débitage* does not fit with these materials at Ounjougou. Flake *débitage*, retouched flakes and shaped tools on pebbles, along with the polyhedrons, spheroids and bolas component, give the first evidence of an Early Sone Age in stratigraphy in Western Africa.

Mots-Clés: Early Stone Age, lithic technology, polyhedrons, spheroids and bolas, Western Africa, techno, functional approach

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Nouvelle recherche sur l'acheuléen de l'Erg Tihodaïne, Tassili n'Ajjer, Sahara central : Exemple de la SET-W1

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Le gisement (SET-W1) se localise sur la bordure nord-ouest de l'Erg Tihodaïne, un massif dunaire au pied du Tassili n'Ajjer. Il se présente sous forme d'un Affleurement de dépôts sédimentaires renfermant une industrie lithique de type Mode 2 et des restes osseux de grands mammifères en bon état de conservatio. Bien que le gisement ait connu de maintes visites scientifiques, son contexte comporte encore multiples points d'ombre. De nouvelles recherches, entreprises par le CNRPAH depuis 2018, ont mis au jour de nouvelles observations sur les aspects physiographiques, stratigraphiques et archéologiques du gisement. Les nouveaux travaux de terrain, portés à la fois sur la fouille, la prospection, la stratigraphie, l'étude de la nature de l'association des ossements fossiles et des artefacts lithiques et les craratéristiques de l'assemblage lithique, démontrent un potentiel archéologique évident de la SET-W1, qui conserve encore une disposition informative importante à exploiter pour l'étude et la compréhension des hominidés du pléictocène moyen et leur environnemen.

Mots-Clés: Erg Tihodaïne, Acheuléen, Faunes mammifères, Industrie lithique, Stratigraphie, Sahara, Algérie

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L'Acheuléen en Mauritanie

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Les recherches en Mauritanie ont pris une nouvelle tournure avec les découvertes faites dans la région de l'Adrar et la perspectives de l'orientation des recherches sur la Préhistoire. Les sites achéuléens ont toujours intrigués les chercheurs depuis 1931. Le matériel lithique récolté notamment sur les sites de Yeslem II et III présente des caractéristiques typo-technologiques qui démontrent à la fois l'existence d'un projet mais aussi l'opportunisme technique et fonctionnel des hommes dans cette région ; qui de part la concentration du matériel acheuléen, est sans aucun doute un foyer culturel très important dans la compréhension du comportement des hommes. Quelles lecture faire des différentes variétés typo-technologiques? Peut-on parler d'une évolution technologique ou un opportunisme fonctionnel?

Mots-Clés: Typologie, technique, Acheuléen, Paléolithique

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Relecture techno-typologique des industries de Fann (Presqu'île du Cap-Vert, Sénégal) dans leur contexte stratigraphique.

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L'analyse typologique des outillages de Fann, dans la presqu'île du Cap-Vert, a mis en évidence le développement d'une industrie qualifiée tour à tour d'Acheuléen- moustéroïde (Monod), Chelléo-Acheuléen / abbevillien, clactonien, d'industrie à éclats (R. Corbeil), puis industrie à pièces volumineuses et informes de Sangoen (R. Mauny). Mais du fait de l'absence d'études typologiques poussées, Hugot qualifie l'outillage de Fann d'Acheuleén évolué. Cette vision acheuléenne, donnée par le ramassage de bifaces dont certains présentent des incrustations ferrugineuses, est partagée par Descamps. Ainsi, toutes les périodes préhistoriques se retrouvent à Fann, et soulève la problématique de la position stratigraphique des outils.
This communication se propose d'étudier les contextes de ramassage, de procéder à un classement techno-typologique des pièces enregistrées au laboratoire d'archéologie, de reprendre les prospections et l'étude des formations sédimentaires en relation avec des outillages opérées il y a quelques décennies (Barbey et Descamps, 1968; Camara et Duboscq, 1986).

Mots-Clés: Acheuléen, Chelléo, Acheuléen, industrie, moustéroïde, Sangoen, techno, typologie.

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Acheulian and Premousterian hominin populations in the Middle Pleistocene Europe: new insights from archaeological, genetic and ecological evidence

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Recent advances in the study of Lower Palaeolithic in Europe change our view on the initial stages of European prehistory. It is established now that during the Lower Pleistocene, from about 1.8 to 1.0 Ma, the oldest hominin groups in Europe and adjusting regions of south-west Asia produced the Oldowan industry of core-choppers and small flakes, and virtually lacking retouched flake tools. The European Oldowan industry shows the appearance of retouched flake-tools during the late Lower Pleistocene, from about 1.0 to 0.8 Ma. The Oldowan industry developed in Europe in parallel to the Acheulian development in Africa. Makers of the European Oldowan industry represent the European branch of *Homo erectus sensu lato*, which earlier form is defined as *Homo erectus georgicus* (in Dmanisi) and the later form is defined as *Homo antecessor* (in Atapuerca). This initial Oldowan hominin population in Europe well adapted to climatic fluctuations in different European ecosystems and started expansion into northern and north-eastern regions of Europe with moderate climate and cold, snowy winters since about 1 Ma.
Solid evidence for a local origin of the Acheulian is absent in Europe. The Acheulian industry first appeared in West Europe in the onset of Middle Pleistocene (c. 800-750 ka) as a formed stone working tradition, showing affinity with African Acheulian and associated with the arrival to Europe of a new hominin population. Makers of the Acheulian industries in Europe are commonly defined as *Homo heidelbergensis sensu lato.*

Earlier, we have offered a hypothesis that after invasion and following spread of the Acheulian population within Europe the stone-working tradition showing derived Oldowan characteristics, such as core-choppers, small flakes and flake-tools, and lacking characteristic Acheulian features, such as the production of large cutting tools, and large flake, Levallois, and laminar technologies, was present during the Middle Pleistocene in Central and East Europe, beyond the areas of Acheulian expansion in West Europe. We defined this post-Oldowan industry dating from the Middle Pleistocene as the 'Pre-Mousterian industrial complex' or 'Premousterian', following the original definition offered by H. Obermaier in the 1920s (Doronichev and Golovanova, 2010; Doronichev, 2016).

In our report we discuss modern archaeological, genetic and ecological evidence which indicates the coexistence in Europe of two Lower Palaeolithic hominin populations, represented by

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the Acheulian Industry and the Premousterian Industry, during most of the Middle Pleistocene, between _~800/750 and 300/250 ka. The data shows that stone working traditions, behavioural strategies, and population histories of these two hominin populations were substantially different.

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Mots-Clés: Acheulian and Premousterian, two hominin populations, Middle Pleistocene Europe, archaeological, genetic and ecological evidence

Hominin subsistence strategies around 0,3 Ma in northern France: What can we learn from the Acheulean site of Cagny-l'Épinette (Somme Valley)?

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Despite a growing interest in Lower Palaeolithic sites, detailed intra-site spatial analyses of their activity areas are still rare.
Acheulean assemblages have been discovered within the alluvium (MIS 9) at the open-air site of Cagny-l'Épinette (Somme Valley, France). The lithic industries and, more importantly, the well preserved faunal remains make the site of particular interest for spatial analysis and behavioral interpretations. However, three decades of excavations (1980–2010) along with individualized studies have led to a fragmented history of research methods and consequently, divergent interpretations.

With a new research project (2016–2021) dedicated to restudying the assemblages from Cagny-l'Épinette comes the first site-scale analysis of these Acheulean assemblages as a whole. This thorough overall spatial analysis consists of three parts – archaeostratigraphy, taphonomy and study of the hominin activities organization – each of them considered through a quantitative and spatial approach.

The outcomes can be summarized as follows: The revised archaeostratigraphy merges the previously multi-layered Acheulean assemblages into a single layer within a fine-grained fluvial sedimentary unit (MIS 9). As for the taphonomic analysis, few indicators of disturbance have been identified, suggesting artifact discard in a primary context followed by a rapid burial. Finally, spatial patterns observed among faunal remains and lithic artifacts suggest two main activities were performed on site: mammalian carcass processing (i.e. B. primigenius, C. elaphus, and E. mosbachensis) and lithic productions (i.e. flakes, retouched flake tools and handaxes). The relationship between the two is confirmed by anthropogenic marks observed on bones and deer antlers (e.g., cut marks, green bone breakages, impact points, removal scars), among which new

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bone and antler tools have been identified. These observations imply hominin exploitation of carcasses for both alimentary and utility purposes.
The aim of this paper is to show that, beyond the disorganized appearance of scattered remains, a zonal division with butchery and knapping activities can be identified at the site of Cagny-l'Épinette. Furthermore, based on spatial patterns, the hypothesis of distinct uses among stone tools during carcass processing, and bone and antler tools during stone knapping emerges. This paper intends to present the new resulting interpretations and their contribution to our knowledge regarding the diversity of hominin subsistence behaviors, i.e., resources acquisition and processing, around 0,3 Ma.

Mots-Clés: Cagny l'Épinette, Middle Pleistocene, Activity Areas, Spatial Analysis, Geographic Information System.

The earliest evidence of Acheulian occupation in Northwest Europe: rediscovery of the Moulin Quignon site, Somme valley, France

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The dispersal of hominin groups with an Acheulian technology and associated bifacial tools into northern latitudes is central to the debate over the timing of the oldest human occupation of NW Europe. The recent rediscovery of *in situ* archaeological lithic artefacts on the historic site of *Abbeville - Moulin Quignon* demonstrates that the first Acheulian occupation north of 50∘N occurred at least 650 ka ago. This archaeological assemblage was discovered in 2017 into a fluvial sequence of sands and gravels overlying the chalk bedrock at a relative height of 40 m above the present-day maximal incision of the present-day River (Formation VII of the Somme stepped terraces system), at the exact place of the quarry excavated in the 19th century by Jacques Boucher de Perthes. These deposits have been dated using the ESR-quartz method to 672± 54 ka and can be allocated to early MIS 16 glacial period,, in good accordance with their stratigraphic position regarding to the subsequent Interglacial deposits of the Carpentier Quarry *Marne Blanche* (MIS 15) making the upper stratigraphic unit of the Somme system Formation VII in Abbeville.
More than 260 flint artefacts were recovered, including large flakes, cores and five bifaces. The corpus of bifaces is composed of a crudely-made tool and largely shaped tools indicating the management of the bifacial volume of the piece. The technological behaviour enters into whet we observe on pene-contemporaneous sites located in the Southern part of Europe (la Noira, France; Notarchirico, Italy).

This discovery pushes back the age of the oldest Acheulian occupation of north-western Europe by more than 100 ka and bridges the gap between the archaeological records of northern France, England and Southern Europe. It also challenges hominin dispersal models in Europe showing that hominins using bifacial technology, such as *Homo heidelbergensis,* were probably able to overcome cold climate conditions as early as 650 ka ago and reasserts the importance of the Somme valley, where the 19th century allowed crystallizing knowledge coming from different

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scientific fields in France and UK.

Mots-Clés: Acehulean, France, North, West, bifaces, geology

PRODUCTION AND USE OF SPHEROIDS IN THE LOWER PALAEOLITHIC IN EUROPE AND AFRICA: COMPARATIVE AND INTEGRATIVE APPROACH TO ENIGMATIC AND EMBLEMATIC OBJECTS

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Polyhedrons, spheroids and bolas are enigmatic cubic to rounded stone objects present in lithic series since the Lower Pleistocene. These objects are considered both as final phase nuclei or firing pins and many other more or less fanciful hypotheses have been proposed in the past. Most of these attributions have never been demonstrated. These objects are frequent in Africa and present in Asia since the Acheulean but are much rarer in Europe. Artifacts with same shape are also known in recent archaeological and ethnographic contexts in America.
The aim of the project is to identify the characteristics that make it possible to determine the methods of manufacture and use of these objects. The question will be addressed by mobilizing a broad comparative approach, including recent archaeological, ethnographic and experimental data through 1) the realization of an ethnoarchaeological synthesis, 2) a reconstitution, through experimental archaeology and wear analysis, of the mode of manufacture and possible forms of use, 3) an analysis of archaeological material from the Lower Palaeolithic in Europe and Africa.

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The results of the archaeological, experimental, wear analysis and ethnographic study of polyhedrons, spheroids and bolas will make it possible to propose new hypotheses on the role and the method of manufacture of these enigmatic objects abandoned in prehistoric sites. It will also fuel debates on the presence of apparently identical objects in archaeological records that are distant in time and space and discuss the question of objects from independent local histories made by different hominids or objects migrating with populations and adapting to the new needs of these populations. These lithic objects can indeed be considered as "trace elements" that can help to identify the possible dispersion of human groups and/or traditions in Eurasia. They can also be vectors for identifying the modes of adaptation of populations to varied (mineral and vegetal) or new environments, inducing the loss of certain elements of the "toolbox" or a reorientation of manufacturing methods according to needs and available materials.

Mots-Clés: Spharoids, Lower Paleolithic, Europe, Africa, Comparative approach, Integrative approach

AN ARCHAEOSTRATIGRAPHIC STUDY FOR THE MIS11 SITE OF LA CANSALADETA (TARRAGONA, SPAIN): TECHNO-SPATIAL INVESTIGATION THROUGH REFIT / CONJOIN CONNECTIONS

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This study presents the second systematic refit / conjoin analysis of MIS 11 site La Cansaladeta (Tarragona, Spain). Previous study of the lithic assemblage of levels E and J in terms of cluster / density, orientation refit / conjoin connections and technological investigations obtained incredibly good spatial information. Though our research initially concentrated on the horizontal perspective, the presence of a snapshot between the levels E and I informed us for the archaeostratigraphy and site formation investigation (Yeşilova et al. under review).
Currently, we continue from the point that we stopped. The archaeological levels D – E – J were investigated from the archaeostratigraphic perspective. Our study is based on the systematized refit / conjoins connections and developed with three-dimensional data of the lithic elements by GIS. In terms of methodology, the excavation area was divided into bands with 25 cm intervals along the West-East and South-North direction, which allowed for a high-resolution identification of different moments.

The results show that some parts of the levels have different moments, which are clearly separated with hiatuses. This issue refers to the sub-levels. The directionality of the connection lines of the refit / conjoin sets follows the shape of the levels and displays almost no vertical displacement. This is an extremely important result of how the site is very well preserved. Additionally, almost complete reduction sets show important technological data, and observed differences point to site functional variations. In the light of these current results, the lithic sequence of La Cansaladeta, despite counting so far with a reduced excavated surface, reveals as a key MIS 11 site where to apply broad methodological application such as refit / conjoins, GIS and technological analysis.

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Mots-Clés: Archaeostratigraphic study, Miss11 Site, La Cansaldeta, Tarragona, Spain

LES CULTURES À BIFACES DU PALÉOLITHIQUE ANCIEN DANS LE MONDE : DE L'AFRIQUE AU PROCHE-ORIENT, À L'EUROPE, À L'ASIE DE L'EST ET AU SUD-EST ASIATIQUE.

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Les cultures paléolithiques à bifaces du Pléistocène inférieur et moyen en Afrique, en Europe, au Proche-Orient, en Asie Centrale et orientale et dans le Sud-Est asiatique, souvent appelées acheuléennes, correspondent-elles à une culture homogène, ayant une origine commune, qui aurait diffusée progressivement à travers différents continents en acquérant progressivement des caractères propres ?
Elles sont caractérisées par la présence, plus ou moins abondante de bifaces, des outils lithiques à symétrie bilatérale et souvent bifaciale, plus ou moins excellente, sur des roches souvent de bonne qualité et parfois de belle couleur, qui témoignent de l'émergence dans la cognition humaine du sens de la symétrie et, dans une certaine mesure, du sens de l'esthétique

La présence de bifaces, en proportions très variables dans les assemblages lithiques, pouvant varier de moins de 1% jusqu'à plus de 30 %, est l'élément principal qui parfois a permis de les dénommer.

En Afrique, les plus anciennes cultures à bifaces, généralement dénommées acheuléennes, sont présentes dès 1,75 MA, en Afrique de l'Est, par exemple à Konso Gardula. Elles sont associées à la présence de pics, de hachereaux, de polyèdres et de grands éclats bruts de taille. Les petits outils retouchés sur éclat ou sur débris sont rares et de facture médiocre. Elles sont portées par des Homo erectus archaïques (Homo ergaster) et des Homo erectus classiques.

Au Proche-Orient, les cultures du Paléolithique ancien à biface sont présentes dès 1,4 million d'années, à Ubeydia par exemple. Elles se caractérisent, comme en Afrique, par la relative abondance de grands éclats à tranchant brut de taille, une assez forte proportion de galets aménagés, la présence significative de polyèdres, de pics, de hachereaux et une proportion un peu plus importante de petits outils retouchés de meilleure facture que dans les sites africains.

En Europe, les industries du Paléolithique ancien à bifaces apparaissent à une époque plus récente qu'en Afrique et au Proche-Orient. Elles sont présentes à partir de 0,7 à 0,6 MA portées par des Homo erectus européens évolués, comme à la Caune de l'Arago à Tautavel, (souvent

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appelés *Homo heidelbergensis*).

Les proportions de bifaces dans des assemblages lithiques sont généralement peu importantes, les pics sont plus rares qu'en Afrique, les hachereaux de type africain très rares ou absents, ainsi que les polyèdres. En revanche, les petits outils retouchés sur éclat ou sur débris, d'excellente facture, sont relativement abondants.

Sur les différents continents, l'apparition des cultures du Paléolithique ancien à bifaces, toujours associées à de grands éclats à longs bords tranchants bruts de taille, est liée à un nouveau comportement des hommes qui ont abandonné ou réduit leurs activités de charognage pour devenir des chasseurs

Les cultures du Paléolithique ancien à bifaces et à grands éclats à tranchant brut de taille paraissent donc bien correspondre à un nouveau comportement en relation avec les activités des premiers peuples chasseurs qui avaient besoin de grands couteaux pour découper le cuir des grands herbivores qu'ils avaient abattus à la chasse.

Les idées se propageant plus rapidement que la migration de peuples, il est possible que la notion de symétrie, ait diffusée progressivement à travers les différents continents.

Il est néanmoins évident que l'évolution des cultures du Paléolithique ancien à bifaces, souvent réunies artificiellement sous le nom d'Acheuléen, ont évolué indépendamment sur les différents continents.

Mots-Clés: Culture Biface, Paléolithique ancien, Afrique, Proche, Orient, Europe, Asie de l'Est, Sud Est asiatique

FOR OUR WORLD WITHOUT SOUND. THE OPPORTUNISTIC DEBITAGE IN THE ITALIAN CONTEXT: A METHODOLOGICAL EVALUATION OF THE LITHIC ASSEMBLAGES OF PIRRO NORD, C'A BELVEDERE DI MONTEPOGGIOLO, CIOTA CIARA CAVE AND RIPARO TAGLIENTE.

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The opportunistic debitage, originally adapted from Forestier's S.S.D.A. definition, is characterized by strong adaptability to local raw material morphology and its physical characteristics and it is oriented towards flake production. Its most ancient evidence is related to the first European peopling by Homo sp. during Lower Pleistocene starting from 1.6 Ma and gradually increasing around 1 Ma. In these sites, a great heterogeneity of the reduction sequences and raw materials employed is highlighted, bringing to the identification of multiple technical behaviours. However, the scientific community does not always agree on associating the concepts of opportunism and method to describe these lithic complexes. The same methodological issues remain for the Middle Pleistocene where, simultaneously to an increase of the archaeological evidence and the persistence of the opportunistic debitage, the first bifacial complexes are attested. Further implications concerning the increasing complexity highlighted in core technology management are now at the centre of an important debate regarding the genesis of more specialized method (Levallois and Discoid) especially during MIS 12 and MIS 9. We suggest that the opportunistic debitage could be the starting point for this process, carrying a great methodological and cultural potential within itself.

Mots-Clés: opportunistic debitage, evaluation, lithic assemblages, Lower Pleistocene

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BILAN DE L'ÉTUDE DES RESTES HUMAINS FOSSILES DE LA CAUNE DE L'ARAGO, TAUTAVEL, FRANCE

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Entre 1964 et 2020, 151 restes humains ont été découverts au cours des fouilles dans la Caune de l'Arago à Tautavel (Pyrénées Orientales) dont l'âge est compris entre 580 000 pour les restes les plus anciens de la grande unité archéostratigraphique, jusqu'à 300 000 ans pour les restes les plus récents dans la grande unité archéostratigraphique C.
Par leurs caractéristiques anatomiques ils peuvent être rapportés à des Homo erectus européens évolués. En effet, ils partagent des caractères communs avec les formes d'Homo erectus connus en Asie et en Afrique : comme la forme cranio-faciale et en particulier les caractères des mandibules, une grande extension de l'arcade alvéolo dentaire à convexité antérieure, un corps mandibulaire avec un indice de robustesse élevé, un planum alvéolaire sub-horizontal et une ligne mylo-thyroïdienne saillante peu inclinée. La boîte crânienne présente une face très prognathe, une forme pentagonale. La découverte de très nombreuses dents confirme cette attribution.

Nous sommes en présence d'une nouvelle forme qui ne permet pas de la rattacher à l'Homo heidelbergensis attribué à la mandibule de Mauer.

La population des Homo erectus européens évolués dans la Caune de l'Arago se caractérisent par un très grand nombre d'enfants, avec une forte mortalité entre 7 et 12 ans et la présence d'adultes entre 18 et 30 ans. L'espérance de vie était d'environ 20-25 ans. Un seul individu est décédé à l'âge de 40 ans environ.

D'autre part, il est intéressant de souligner la présence de nombreuses dents déciduales perdues naturellement du vivant des enfants qui séjournaient dans la grotte.

Mots-Clés: Restes humains fossiles, La Caune de l'Arago, Tautavel, France

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”SNAKES AND LADDERS" IN THE LOWER AND MIDDLE PALAEOLITHIC: FROM COGNITIVE SURPRISE TO "SKILL"

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Archaeological evidence of Early and Middle Pleistocene behaviour of the genus *Homo*, such as stone hand-axes or traces of fire, shows an uneven spatiotemporal distribution across the Old World between two million and two-hundred thousand years ago. A scientific paradigmatic interpretation can help us to interpret behavioural evolution in early *Homo*. Cognitive surprises, favouring anomalous behavioural propensities to sporadic expression, suffice to explain apparently random "snakes-and-ladders" appearances and disappearances of Palaeolithic skills in the Early and Middle Pleistocene. The interpretation applies the principle of stationary action, which underpins the universal biophysical *free energy principle*, to self-organising systems at an evolutionary time-scale. Unusual personal attainments, often explained by invoking progressive ascent of evolutionary phylogenetic "ladders" of cognitive and technical abilities, could be disregarded in a hominin community that failed to imagine or articulate possible advantages for its own survivability. Such failure, as well as diverse fortuitous demographical accidents, could erase from collective memory the recollection of exceptional individual conduct, which disappeared, down an unanticipated "snake", so to speak, of the human evolutionary "puzzle". The notion of a chaotic, disorganised puzzle discomforts palaeoanthropologists and Palaeolithic archaeologists who often explain it *away* with appeals to accommodative self-fulfilling conjectures thought to be not implausible, e.g., that, probably, separate palaeospecies of *Homo* differentially possessed cognitive abilities that conjecturally underlay the differential presence or absence in the Pleistocene archaeological record of traces of particular behavioural outcomes or skills. However, an alternative methodological perspective, grounded in the fundamental biophysical relationships between organisms and their environments, affords a parsimonious, prosaic, deflationary account for appearances and disappearances of behavioural outcomes and "skills". This perspective invokes a methodological paradigm grounded in existential principles, notably the *free energy principle*, that underpin the evolution of living organisms, which have been expounded in innumerable scientific papers by psychiatrist Professor Karl Friston, F.R.S., of University College London where he is Professor of Imaging Neuroscience at the Institute of Neurology and The Wellcome Centre for Human Imaging. The proposal as developed here is that some, at least, of the irregular regularities and regular irregularities of phenomena attributable to *Homo* in the distant Pleistocene record reflect the kinds of plausibly anomalous behavioural outcomes that must have occurred often in a random "snakes-and-ladders" model of evolution in early members of our genus, regardless of their skeletal palaeospecific taxonomy, who, when faced with cognitive surprises, failed to maintain orthodox behavioural responses and, instead, demonstrated a

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particular neurobiological propensity for exploring unorthodox possibilities. Development of the argument is accompanied by examples drawn from Lower and Middle Palaeolithic sites.

Mots-Clés: Snakes, Ladders, Lower Paleolithic, Middle Palelithic

The Aegean Acheulean: a view from Rodafnidia on Lesbos

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This paper presents results from work conducted on Lesbos island to explore the early Palaeolithic record of the Aegean Sea. During the last decade systematic excavation at Rodafnidia has brought to light an extensive Acheulean site situated on a volcanic setting, near the shore of the Kalloni palaeolake and by a thermal spring. The paper presents geological data to discuss the structure of the Lisvori basin and the respective sediment sequences that were deposited during the Quaternary along with the chronostratigraphy of the site. p-IRIR dating obtained for the excavated sediments at Rodafnidia has returned minimum ages for the Acheulean activity on Lesbos placing it to the second half of the Middle Pleistocene. The lithic industry derives from fluvial deposits and comprises the full gamut of an Acheulean toolkit, with noumerous LCTs (trihedrals, handaxes and a notably high proportion of cleavers) and other tools knapped on three types of cherts, tuff and basalt. At Rodafnidia complete chaine operatoires aimed to produce bifaces by means of debitage and façonnage on a variety of blanks (large flakes, nodules) are brought to light. The paper further examines the main attractions that invited Middle Pleistocene hominins to return to what is today an island but during the glacial periods was organically connected to west Asia. Research on the Lesbos Acheulean archaeology has accumulated a body of evidence with many similarities and a few differences with other homologous sites in Africa and Eurasia. It makes a strong case for including this part of the NE Mediterranean Basin in the reconstructions of Lower Palaeolithic Europe, envisioning the Aegean as a region of affordances rather than a barrier to Middle Pleistocene hominin settlement and dispersals at the heart of Eurasia.

Mots-Clés: The Aegean Acheulean, Rodafnidia, Lesbos

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S19-A: Identity, Timing and Environments of the Pleistocene and Holocene Cultures in Northwest Africa

From the "Chaîne opératoire" to the economy of the raw material in the upper Pleistocene: the example of the Rhafas cave industry (Jerada, Morocco).

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Abstract:
One of the main concerns about the North African paleolithic is focused toward the understanding and the clarification of the definition of the lithic industry in the Middle Stone Age and the Aterian context. This work is a diachronic and a multiproxy approach to estimate 1/ the variability of the different occupations in a well-known stratigraphic context and 2/ the distribution of the human circulation in their landscape. The study is directed toward the lithic industry of the Rhafas cave (Jerada, Morocco) for which the very well dated stratigraphic sequences and the researches that have been carried out for several years by French and Moroccan teams, makes it a good candidate for the development of this project and for this methodological approach.

Mots-Clés: North Africa, Middle Stone Age, Lithic industry, Aterian, Rhafas cave

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An experimental approach to the functional study on MSA lithic in Morocco

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The origin of Human complex Behaviour is one of main debated topics within the global archaeological community. In North Africa, criteria defining this behaviour appeared with the Aterian culture during the second part of the Middle Stone Age (_~145 ka). Lithic has known during this period an evolution within technics of manufacture as well as a morphological diversity including not only tangs but also bifacial pointes, end scrapers, side scarper, Levallois flakes, blades and bladelets. Functions of this tools, however, are still unknwon; only a few use-wear studies were done to answer some specific questions.
In this work, we are realizing a techno-functional study on lithic tools from Aterian context of four Moroccan sites (Taforalt, Rhafas, Bizmoune and Bir El Kouat) based on an experimental protocal that includes both the fieldwork (Lithic raw material proccurement) and Laboratory work (experiments and use-wear study).
Our goal from this work is to better understand Aterian behaviours in different chronologic and geographic contexts based on the study of ”micro-variabilities" within this culture using both technology and functional studies.

Mots-Clés: Human complex behaviour, Middle Stone Age, Aterian, Lithic, Use, wear analysis

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From North to South: paleoenvironment according to tooth-wear analysis during the Upper Pleistocene in Bizmoune, El Khenzira and Taforalt (Morocco).

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Morocco is a geographically and climatically highly fragmented territory occupied for about 300,000 years by *Homo sapiens*. This area is currently characterized by the presence of four large mountain ranges but also plateaus, plains and coastlines subject to a Mediterranean-type and temperate Atlantic climate from the North to more open landscape in the South. The analysis of environmental parameters at a local level is therefore crucial for understanding the context and living environments of human populations. We present here a study of tooth wear analysis of different herbivores in human settlements distributed along a North-South axis in the sequences of Taforalt (Oujda region), El Khenzira (El Jadida region) and Bizmoune (Essaouira region) in order to review their diet. By considering these faunal associations and inferring the evolution of plant cover, we document paleoenvironmental variations according to the geographic distributions of theses 3 sites during the Upper Pleistocene.

Mots-Clés: Paleoenvironnement, Upper Pleistocene, Morocco, Tooth wear, herbivores

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Contribution à l'étude du Middle Stone Age au Maroc : Processus de fabrication et du traitement des matières colorantes

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Différents sites préhistoriques (en Afrique du Sud, en Proche Orient, en Europe, en Afrique du Nord, ...), notamment au Maroc, ont permis de mettre en évidence l'existence d'un certain nombre d'indices considérés comme des preuves manifestes une capacité cognitive moderne et une acquisition d'un langage articulé à travers l'utilisation d'objets vraisemblablement destinent pour une utilisation de dimensions soit symboliques ou fonctionnelles. En effet, les matières colorantes constituant l'un des artefacts archéologiques couramment découverts et qui témoignant d'un savoir-faire technique, d'une pensée symbolique, d'une gestion économique et des pratiques esthétiques.
L'utilisation des matières colorantes remonte à des milliers d'années, quand l'Homme préhistorique a appréhendé la valeur symbolique liée à une pensée abstraite ou peut être à une identité ethnique, et la valeur fonctionnelle, qui est aussi appelée " utilitaire ou non utilitaire " de ces éléments minéralogiques. Ce type de vestige est retrouvé dans les sites préhistoriques sous différents aspects à savoir des blocs de matière première, soit bruts ou traités thermiquement, de la poudre, ou des résidus/pigments sur divers supports (coquilles, outils lithiques, industrie osseuse ou sépultures).

De ce fait, l'étude de l'un des aspects culturels des groupes Atériens à savoir le processus de fabrication et du traitement des matières colorantes représente une contribution fructueuse pour approcher le comportement dit " moderne " du MSA en Afrique du Nord. C'est ainsi, qu'à partir d'un protocole expérimental nous avons essayé de reconstituer la chaîne opératoire de la fabrication et du traitement des matières colorantes, ceci dans le but de déterminer leur possible fonction/usage par les populations atériennes des deux grottes Bizmoune et Rhafas : un rôle symbolique ou fonctionnel ?
La comparaison des résultats expérimentaux avec ceux archéologiques nous a permis de préciser les techniques de la fabrication et du traitement, mécanique et thermique des matières colorantes (jaunes et rouges).

Mots-Clés: les matières colorantes, Middle Stone Age, Afrique du Nord, comportement humain, complexité cognitive, valeur symbolique, valeur fonctionnelle.

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ETUDE DE LA PARURE PALEOLITHIQUE DE LA GROTTE D'EL KHENZIRA I, CAP BLANC, MAROC (FOUILLES 2017)

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Le goût de la parure ou le besoin d'être paré fut développé depuis les époques préhistoriques, où l'Homme a saisi le rôle fédérateur de la parure, celle-ci a été produite sur plusieurs supports (coquillages, dents des animaux, pierres...). Contrairement au constat que l'apparition des ornements personnels a été faite tardivement avec l'arrivée de l'Homme moderne en Europe vers 40 ka BP (White, 2007), les découvertes récentes ont infirmé cette hypothèse en montrant que l'usage de la parure est connu depuis des périodes très anciennes dans plusieurs sites en Afrique, au Moyen Orient et en Europe. L'utilisation de la parure a donné naissance à un débat important concernant l'émergence de la complexité cognitive et la pensée abstraite chez les atériens, population caractéristique du Middle Stone Age (MSA) en Afrique du Nord.
Ce travail s'intéresse uniquement au côté technique et fonctionnel des objets de parure en coquillages marins de la grotte d'El Khenzira I dans la région d'El Jadida, il tente d'apporter quelques éléments de réponse sur les différentes méthodes et techniques de perforations effectuées par les atériens et les ibéromaurusiens du Later Stone Age (LSA), ainsi que les fonctions et les utilités de ces objets pour ces deux entités culturelles.
Pour atteindre cet objectif, nous nous sommes appuyés sur une approche expérimentale et fonctionnelle, qui vont nous permettre de reconstituer la mémoire des gestes et la chaîne opératoire de la perforation d'une part et les fonctions de ces " perles " d'autre part. Le protocole expérimental a été exécuté sur une collection de coquilles marines de trois espèces à savoir : (*Littorina obtusata, Trivia arctica* et *Pecten maximus*) qui proviennent de la région de Témara-Skhirat, plusieurs techniques de perforation ont été entreprises afin d'établir une comparaison entre les objets expérimentaux et archéologiques, et de vérifier s'il y a une filiation technologique entre les atériens et les ibéromaurusiens de la grotte d'El Khenzira I. L'approche expérimentale a permis de fournir des résultats très satisfaisants. Elle a montré les caractéristiques et les détails technologiques de chaque type de perforation.

Mots-Clés: Parure, complexité cognitive, "modernité culturelle", Homo sapiens, ornements personnels, Atériens, expérimentation.

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Petroarchaeology research into the Aterian lithic raw material of Bizmoune cave at Essaouira (Morocco)

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A petroarchaeological study was carried out on the lithic raw materials of "Bizmoune" cave, located in Essaouira. It mainly concerned the study of the *Middle Stone Age* groups' productions, in particular Aterian groups, in order to be able to determine their behavior towards the exploitation of resources in their environment. The objectives are to characterize raw materials used by prehistoric groups that occupied the cave of "Bizmoune", to locate primary and/or secondary sources of raw materials, and to try to specify the perimeter of mobility of prehistoric groups in their territory.
The answer to questions that are related to our problematic necessitated the application of an *ad hoc* methodology, including fieldwork (surveys in Essaouira's region) and laboratory work (petrographic, geochemical, and typological analysis of lithic collections).
This study made it possible to know the limits of macroscopic characterization and subsequently to prove the importance of microscopic and geochemical methods. The prehistoric groups of "Bizmoune" cave used for about seven types of rocks. Indeed, qualitative and quantitative data have shown that flint was the most preferred type by these groups.

Mots-Clés: Geoarchaeology, petroarchaelogy, geology, geochemistry, geomorphology, petrography, lithic raw material, mobility, prehistoric groups, Upper Pleistocene, Bizmoune cave.

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Contribution to the North African MSA Blade Technology: layer 4c from Bizmoune Cave (Essaouira, Morocco)

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Blades technologies were always attributed to modern Humans. And discussed by many authors since the last decades. The presence and dominance of this lithic technology in most of the assemblages from around the world was seen as a major stage in the evolution of Hominid technological capacities of the Paleolithic groups.
Despite the lack of studies about this subject in North Africa and the widespread of the laminar industry in all the sites of Morocco (& North Africa), make the data regarding the production methods (*Chaîne opératoire*) uncertain and vague.
The aim of this research is to focus on studying typological and technological aspects of the laminar artefacts (laminar Flakes, blades and bladelets) uncovered from the layer 4c of Bizmoune cave (Morocco, Essaouira region) for a better understanding of this type of blanks.

Mots-Clés: Prehistory, Lithic, MSA, Morocco, Modern behavior

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Contribution à l'exploitation des ressources malacologiques des espaces littoraux à la fin du Pléistocène et à l'Holocène au Maroc oriental et atlantique

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L'expérimentation en archéologie est un outil méthodologique qui a souvent contribué à mieux comprendre les processus de fabrication des différentes productions humaines dans le passé. Auparavant, les recherches se sont été appuyées directement sur l'étude des collections préhistoriques en ayant recours à des hypothèses et des modèles. Notre étude est basée sur une approche expérimentale et tracéologique de deux espèces malacologiques : *Cerastoderma glaucum* et *Mytilus galloprovincialis* et qui a pour but l'étude des coquillages perforés dans la préhistoire du Maroc. La comparaison entre les résultats expérimentaux et archéologiques a permis de déceler la fonction des objets de parure préhistoriques de deux grottes marocaines : Dar Es Soltan 1 et Rhafas , tout en précisant les processus et les techniques de perforation des coquilles.

Mots-Clés: Objets de parure, MSA, Néolithique, Maroc, Archéologie expérimentale, Tracéologie.

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Cultural transitions in the Middle and Later Stone Age records of North Africa : an overview from Morocco

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An intensely debated issue in human evolutionary research is the African origins and dispersal of *Homo sapiens* into North Africa. Significant uncertainty remains on the nature, timing and associated paleoenvironments with cultural differentiation of the North African Middle Stone Age (NAMSA) and recent excavations and associated various dating techniques have spawned a new hypothesis that the NAMSA groups appeared as early as 300,000 yrs ago in Jebel Irhoud, Morocco. Knowledge is highly limited on this MSA population expansion, particularly when these early hominids appeared initially, the duration of occupation and the palaeoenvironmental context during occupation. There is an especially rich archaeological record near Casablanca. However it is unclear when these dispersals took place in North Africa or how successful they were initially. Research in some sites in Morocco provides relevant results demonstrating exceptional potential covering the critical periods of the possible emergence of the blade technology, bifacial foliates, the persistence of some late Acheulean "archaic tools" and the precocious appearance of symbolic artefacts and other behavioural indicators of the cognitive complexity. It should also be possible to demonstrate whether Northwest Africa served as a refugium even during the most arid periods of the last interglacial-glacial cycle. The transition between the MSA and LSA occurs between 30 and 20,000 years ago in Northwest Africa, but may not involve a simple and uniform process. In Morocco, the youngest age estimates for the latest MSA levels are in the range of _~29 ka cal BP based on several independent dating techniques. The Later Stone Age industry dominated by microlithic backed bladelets recorded at numerous sites from inland and coastal areas of the Maghreb (modern Morocco, Algeria, Tunisia and parts of Libya). The chronology of the Later Stone Age has been the subject of intensive study in recent years and the dating evidence now supports the emergence of microlithic LSA technology in the Maghreb by at least _~25 ka cal BP

Mots-Clés: MSA, LSA, Transition, North Africa, Morocco

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Spatial distribution of the Upper Pleistocene in the region of Assilah

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Al Manzla and Arbaa Ayacha regions (next to Assilah, Morocco) have yielded many prehistory artefacts from many different ages (ESA/MSA/LSA/Neolithic), and this during two seasons of a Moroccan-Quatarian mission.
The first season (2000) have uncovered more than 40 open-air sites, mainly on Al Manzla region. Tanged tools, foliated pieces, bladelets and various cores were many other types of objects were found.
The second season (2018) have established a larger excavation area (Al Manzla, Assilah and Arbaa Ayachaa) in order to find out more about those different human cultures and industries.
The present research will focus on studying typological and technological aspects of some uncovered lithic artefacts from the second season, in the interest of revealing what cultures/ages are beneath those objects. The geographical aspect, considering its importance, will also be discussed.
We will process a geographical analysis of the research region, as well as an LCA (Least Cost path Analysis) in order to understand paths and routes token by prehistoric humans through this area.
We will also present the typo-technological aspects of each site (AM: Al Manzla; and AY: Arbaa Ayacha). Correlations -based on multiple variables- between those sites will also be discussed.

Mots-Clés: Prehistory, GIS, Archeology, Assilah, Morocco, Lithics, Spatial distribution, Correlations

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Assessment of subsistence behavior in a coastal landscape: New data from the Middle Palaeolithic site of Sidi Saïd (second Pleniglacial, northern Algeria)

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Previous excavations at the Late Upper Pleistocene site of Sidi Saïd (Mediterranean shore, Algeria) had yielded a Levalloiso-Mousterian industry associated with rich macro and micro mammals, where the radiocarbon dating gave a chronology between 38 and 20 ka BP. However, several questions on human behavior remained unresolved in this occupation. Here, we present the first data on zooarchaeological analyses of the faunal remains from this site, focussing on the subsistence patterns in this context, and examining the hypothesis linking the arid environment to behavior and adaptation patterns of *Homo sapiens.* In this ecological context, human groups and carnivores conducted their activities associated with animal consumption. A significant anthropic bone breakage patterns and cut marked bones indicate that these human groups exploit meat and marrow from animal carcasses with early access.This site has the great potential for providing archaeological evidence to shed light on the Mousterian of North Africa, chiefly, techno economic patterns allied to subsistence behavior in this environment of the second pleniglacial cold/dry environment.

Mots-Clés: Subsistence activities, Mousterian MSA, Sidi Saïd, Homo sapiens, Algeria.

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L'Occupation humaine du Sud marocain au Pléistocène : état des recherches.

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Le sud du Maroc est très riche en vestiges préhistoriques. Outre les gravures rupestres, les témoignages de l'occupation des marges sahariennes par les populations préhistoriques du pléistocène sont très nombreux dans cette zone sous forme de sites de surface souvent associés aux gites de matières premières. Ces dernières décennies, ces régions ont fait l'objet de recherches archéologiques qui ont permis de mettre en évidence les comportements des tailleurs de pierre. Dans cet article, les auteurs proposent, après avoir soulevé les limites de l'étude des sites de surface, de faire un état des recherches menées dans la région sur les périodes du paléolithique ancien et moyen à partir de l'étude technologique de plusieurs sites.
L'apport de ces recherches est significatif dans la mesure où il permet de faire le lien et d'établir des comparaisons avec les autres régions du Sahara occidental (Saoura en Algérie et nord de la Mauritanie) concernant la gestion des matières premières et les technologies lithiques.

Si des spécificités liées aux matières premières disponibles ont été mises en évidence, il se dégage néanmoins une continuité dans les comportements technologiques des tailleurs de la préhistoire sur toute la frange nord-occidentale du Sahara.

Mots-Clés: Sud du Maroc, sites de surfaces, ateliers de taille, acquisition des matières premières, chaînes opératoires, prédétermination des supports, débitage levallois, blocs dormants.

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Early Middle Stone Age occupations in the atlantic southern Morocco and implications for the origins of modern human behaviour

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Recent survey work in the south of Morocco has revealed the presence of many MSA open air sites which though not well dated (Arzarello et al., 2013) may correlate with the relatively humid conditions that prevailed 130,000 years ago (Coulthard et al., 2013). A previous survey in the southeast of Morocco clearly shows palaeo-rivers, which could have acted as corridors for human migrations.
This new project in Essaouira area allows for the first time an evaluation of a site with a deep, well-stratified sequence in southern Morocco and place it within an environmental context that includes river systems, past shorelines and associated ecosystems. Significant results could be obtained concerning the trans-Sahara contacts since the cave is only 500 km from the border of the Sahara. The sites in the southern Atlantic Morocco provide well-preserved evidence on the archaeology of early *Homo sapiens* and this new project focuses on the how environmental factors such as proximity to the coast or a river or climate change influenced early human movements and distributions. Archaeological sites are placed in context to past sea level variations and proximity to water and ecological resources to better understand human-landscape interactions and this data base will allow for an evaluation of site distribution in southwestern Morocco. In this paper we will also present issues concerning the changes in the lithic assemblages within the MSA technology to test if they are related to changes in climate and environment or to lithic raw material procurement.

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Mots-Clés: Early Middle Stone Age, occupations, atlantic southern Morocco, origins, modern human, behaviour

LE MOUSTERIEN ET/OU L'ATERIEN ET L'IBEROMAURUSIEN DANS LE CONTEXTE LITTORAL MAGHREB MEDITERRANEEN

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C'est sur le littoral Maghreb méditerranéen que s'offre, le plus surement, le schéma chrono-culturel du **M**oustérien et/ou l'**A**térien et de l'**I**béromaurusien, car inscrit dans un système référentiel de grande portée régionale: le Pléistocène supérieur, une épaisseur de temps exprimée par des enregistrements morpho-sédimentaires remarquables, qui s'étalent depuis le Riss-Würm (stade isotopique 5e) jusqu'à la fin du premier inter-pléni-glaciaire (stade isotopique 3). Le deuxième pléni-glaciaire (stade isotopique 2) ne semble pas avoir laissé de traces notables dans le paysage littoral; une lacune dans les connaissances - véritable pierre d'achoppement - qui n'a pas été suffisamment interrogée, notamment dans sa dimension sédimentaire. Elle a été, le plus souvent, surmontée par l'idée d'un hiatus culturel, désignant un moment d'abandon de site, un vide anthropologique et culturel, une hypothèse qui a fini par se convertir en une rupture épistémologique entre *" deux mondes géologiquement et archéologiquement distincts* ".
Toute une construction intellectuelle, articulée autour de mouvements de migration et de déplacement de populations, consistait à réduire ou élargir le hiatus, tantôt en vieillissant tantôt en rajeunissant le Moustérien, l'Atérien ou l'Ibéromaurusien, en demeurant, cependant, dans les mêmes épaisseurs de sédiments. Les recherches en préhistoire et géologie du quaternaire, effectuées sur la façade atlantique du Maroc et les découvertes récentes, réalisées au Maroc oriental, ont, emprunté de nouvelles voies, allant au-delà des approches culturalistes, pour parvenir à des lectures transversales, plus ouvertes, usant d'autres méthodes et matériaux d'examen. Des avancées considérables ont été enregistrées dans la production de la connaissance, sans arriver, cependant, à déplacer véritablement le sujet sur un autre terrain d'exercice de la pensée.

Dans la présente contribution, nous voulions emprunter une voie qui garantirait, d'abord, la cohérence et la concordance des données. L'idée consistant à aller au-delà de l'approche classique par site, qui a la faiblesse de la décontextualisation, pour accéder à une vision plus intégrale – géosystémique - usant d'une grille de lecture et d'analyse qui autorise les corrélations et les comparaisons sur des échelles spatio-temporelles requises. La dimension anthropo-culturelle n'étant envisagée, dans ce cas, qu'aux termes du " récit sédimentaire ", étant entendu qu'en tout lieu et en tout moment l'homme préhistorique représente un temps et un contenu géologique.

La grille de lecture et d'analyse, que nous préconisons, est puisée du cadre régional Maghreb-méditerranéen, qui offre cette image d'une bande littorale parallèle à la mer, disposée en une alter-

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nance d'assises plastiques néogènes, étirées longitudinalement et de massifs rigides anté-néogènes, plus ramassés et davantage élevés. Un dispositif, qui est le produit de l'histoire géologique alpine en domaine tellien, celui des Maghrébides, véritable orogène, développé d'est en ouest, depuis l'Atlantique jusqu'à la mer ionienne (Italie). C'est sur cette bande de relief, tel un palimpseste, que se sont enregistrées les traces des établissements humains préhistoriques, Leur absence où leur présence, outre les conditions de conservation, sont le plus souvent liées à l'histoire particulière des affleurements qu'à celle des établissements humains proprement dits. C'est dans cette signification, pensons-nous, que se comprendrait la rareté des gisements préhistoriques pendant le pléistocène inférieur et moyen et leur remarquable densité dès le pléistocène supérieur.

Devant l'étendue géographique de ce sujet, et pour les besoins de cette contribution, nous avons circonscrit notre sujet à un segment de la bande littorale maghrébine: Le " Sahel occidentale d'Alger " : une entité morpho-structurale formée d'une assise plastique plio-pléistocène, allongée est-ouest parallèlement à la mer, adossée à deux massifs rigides anté-néogènes, la " Bouzaréa " à l'est et le " Chenoua " à l'ouest. D'une centaine de kilomètres de longueur et une dizaine de kilomètres de grande largeur, ce segment de littoral présente un grand intérêt au point de vue géologique et archéologique.

Mots-Clés: LE MOUSTERIEN, L'ATERIEN, L'IBEROMAURUSIEN, CONTEXTE LITTORAL, MAGHREB MEDITERRANEEN

THE DAR ES SOLTAN I CAVE IN ITS GEOMORPHOLOGICAL AND PALEOECOLOGICAL CONTEXT

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The coastal area of Rabat (between Oued Bouragrag and Oued Ikem) is one of the richest regions from a geological, geomorphological and archaeological point of view; as a result, it presents fertile ground for the study of the Quaternary as a whole.
The behavior of prehistoric humans towards animals, in a paleogeographic context, has aroused the interest of several researchers (Ouchaou 2000, Aouraghe 2001, Campmas 2012 and among others). This gives a general idea about the ecosystem of such a population in a spatio-temporal structure.

The reconstruction of the paleoenvironments and lifestyles of prehistoric humans requires the use of paleontological and archaeozoological study, but in their natural setting, which requires a geological and geomorphological study of the space concerned. All of these mechanisms make it possible to tie up the operating chain of a given population and to have an idea of the vulnerability or invulnerability of their living environment, all within the framework of the paleo-ecosystem.

The documentation of the North African fossil faunas of the Upper Pleistocene and the Holocene, particularly in archaeological context, remains incomplete. This study aims to improve our knowledge of the subsistence behaviors of prehistoric, Aterian and Neolithic populations, and to have an updated vision of their lifestyles.

For this reason, our study consists in contributing in the knowledge of the subsistence of the atterian and Neolithic populations, and the part of responsibility of the Humans and / or other accumulators (Carnivores, Rodents, natural accumulation) in the deposits and in the modifications of the surfaces. bones as well as their adaptation to climate change at Dar Es Soltan I cave.

Mots-Clés: DAR ES SOLTAN I CAVE, GEOMORPHOLOGICAL AND PALEOECOLOGICAL CONTEXT

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Apport de l'analyse statistique multidimensionnelle en archéologie : Application de l'analyse en composantes principales l'A.C.P. au mobilier lithique du site Ifri Ouberrid au sud de la ville d'Azrou au Maroc

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Le potentiel archéologique dans le Moyen Atlas central se caractérise par sa richesse et sa diversité. Le mobilier lithique découvert dans le site Ifri Ouberrid est très significatif et son exploration nécessite un outil statistique performant permettant de traiter simultanément toutes les quantités et types d'objets recueillis au niveau de chaque enlèvement. L'analyse statistique multidimensionnelle la plus adéquate et la plus pertinente pour exploiter les données de fouilles de nature quantitative est l'analyse en composantes principales l'A.C.P. indispensable pour bien comprendre et affiner le travail des archéologues et en saisir l'apport historique et scientifique.

Mots-Clés: Outillage lithique, Moyen Atlas, Statistiques, Maroc

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S19-C: Regards croisés sur l'Ibéromaurusien : perspectives comparatives sur les systèmes techniques des technocomplexes du bassin méditerranéen

Walking through Eastern Mediterranean coastlines. Common denominators and striking differences between the Late Pleistocene societies of Cyrenaica and Levant

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There are some techno-typological features of the lithic assemblages traditionally associated with the emergency and affirmation of the Upper Palaeolithic (in Europe and Asia) or Later Stone Age (Africa). Among them a particular attention have gained, in the Lower LSA of Libya, the so-called "chamfered pieces" or "chamfrein". Since their discovery, in the mid-fifties, by Charles McBurney, they have been directly associated with the ones found in the Upper Palaeolithic layers of Ksar Akil Cave, in Lebanon. This association led, in the past, to the development of a diffusionist hypothesis, suggesting the arrival in North Africa of a proper "Upper Palaeolithic" culture from the Near East. This paper offers a critical revision of the technological features of the chamfered pieces and their role within the lithic assemblages of Ksar Akil, on one side, and Haua Fteah, on the other. This will allow to reconsider the hypothesis of a local development in Libya of the Later Stone Age and to evaluate the possible role of a cultural convergence.

Mots-Clés: Later Stone Age, Libya, chamfered pieces, Levant

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The organization of lithic technology among Early Epigravettian hunter gatherers in the Italian peninsula at the end of the Last Glacial Maximum

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It is here provided an overview of the lithic productions in the italian peninsula in the frame of the paleoenvironmental and paleogeographic setting of the end of the Last Glacial Maximum (ca. 24,000- 20,000 calBP). It is first advanced a point of view on the Early Epigravettian hunter-gatherers settlement system and its archaeological correlates around the once exposed Great Adriatic Plain, whose outer areas featured dedicated activities in the earliest phase - like raw material procurement and specialized hunting expeditions - with the plain itself probably acting as residential area. The progressive reduction of the exposed landmass by the end of the LGM is paralleled by the southward diffusion of early Epigravettian assemblages within archaeological contexts increasingly consistent with palimpsests of diversified activities, interpretable as a reorganization of the Epigravettian settlement systems due to geographical and paleoenvironmental modifications. The very south-eastern end of the peninsula holds one among the later evidence of the Early Epigravettian in Italy and represents the tail of the chronological décalage characterizing the sites of the Adriatic side. Here, technological choices are aimed at the maintainability of the tool kits and at optimizing the use of exogenous raw materials. The assemblages are based on lamellar reduction chains, whose products are used in the manufacture of microlithic armatures such as shouldered points, backed points, backed truncated bladelets and triangles, which are often achieved also adopting the microburin technique.

Mots-Clés: Last Glacial Maximum, Early Epigravettian, technoeconomic behaviour, hunter gatherers land use.

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Rethinking the significance of microlithic variability in the Early LSA microlithic records of the Maghreb

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Microliths are small cutting implements made from stone and found around the world in a variety of prehistoric contexts. The global phenomenon of microlithization seems to be associated with a shift toward complex hunting technologies and strategies in response to climate change associated with the Last Glacial Maximum (23–18 ka cal BP). With the advent of the lithic technology approach which launched the movement leading to what is customarily called the concept of the "chaine opératoire", the microlithic industries are better understood and come out of the sclerosis imposed by the proliferation, primarily inherited from the typological analysis. Here, an overview is given to compare and contrast the patterns of variability in microlithic technologies during the Late Pleistocene of the Maghreb and to highlight the relation between the microlithic technologies and the shifting subsistence patterns in response to paleoenvironmental changes. We present the example of sites in Algeria dating from the Late Pleistocene which served, among others, to fuel the Iberomaurusian paradigm (Late Upper Paleolithic culture of the Maghreb). The entire lithic production collected and sieved, made it possible the analysis of the "chaine opératoire" of lithic production. In addition, recent publications on these sites provide new contextual data of palaeoenvironmental, archaeozoological and behavioral patterns, considerably enriching our knowledge on the Late Pleistocene populations. The confrontation of the techno-economic patterns of the Iberomaurusian techno-complexes presented here with the palaeoclimatic and palaeoenvironmental changes highlighted the existence of divergent adaptive responses in relation to the dynamics of palaeoclimatic crises that human populations have known during the Late Pleistocene. The alternative expansion or reduction of the phytogeographic zones are considered as a primary reason for the changes in social and economic strategies applied by hunter/gatherers.

Mots-Clés: Late Pleistocene, Iberomaurusian, Maghreb, microlithic technologies.

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Les ressources animales terrestres et marines durant l'Ibéromaurusien (Paléolithique supérieur, Afrique du Nord-ouest): De l'exploitation économique à l'utilisation symbolique

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Que ce soit dans sa phase récente ou ancienne, l'Ibéromaurusien connaît une activité cynégétique intense accompagnée d'une diversification des modes d'exploitation des ressources aussi bien terrestres que marines. En effet, les ibéromaurusiens chassaient et consommaient les espèces les plus communes du milieu naturel dans lequel ils vivaient, notamment les ongulés de taille moyenne tels que le mouflon à manchettes et l'alcélaphe. Vers la fin du dernier maximum glaciaire (LGM), leur menu va se diversifier de manière significative avec une augmentation des ressources halieutiques (poissons et mollusques marins) et du petit gibier terrestre. De plus, ces chasseurs utilisaient ces ressources animales comme matière première pour le façonnage d'outils en os, essentiellement des outils domestiques. Ils confectionnaient également, à partir de petits coquillages marins non consommables, des éléments de parure, spécialement des pendeloques. Par ailleurs, l'animal a également joué un rôle significatif d'ordre plus symbolique, puisque que les ibéromaurusiens ont utilisés certains de ces attributs, notamment les cornes, comme mobilier funéraire ou bien exploité son image pour la confection de pièces d'art mobilier, telles que les figurines en terre cuite de Tamar Hat et d'Afalou.

Mots-Clés: Ibéromaurusien, Paléolithique supérieur, Afrique du Nord, Ressources animales terrestres et marines, Subsistance, Technologie osseuse, Eléments de parure, Mobilier funéraire, Art mobilier

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Entre Terre et Mer : L'Ibéromaurusien du Sud Tunisien

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Entre 30 000 et 10 000 ka, le Sud tunisien a connu des fluctuations paléoclimatiques extrêmes et fréquentes. Soumis aux conditions climatiques arides du Sahara et aux effets environnementaux moins intenses de la Méditerranée, les groupes humains du Paléolithique supérieur ont préféré s'installer près des points d'eau pérenne à l'intérieur des terres formant des microclimats plus favorables à leur installation. Les relations économiques et culturelles avec la côte méditerranéenne ne se sont pas pourtant arrêtées. C'est ce que nous présenterons dans ce travail qui retrace les grandes lignes de la relation des populations ibéromaurusiennes du Sud tunisien avec la côte méditerranéenne orientale à travers l'étude des objets archéologiques extraits des fouilles faites dans le site de Bir Oum Ali dans la région de Kébili et leurs rapports avec les zones côtières et spécialement avec la zone de l'Oued el Akarit.

Mots-Clés: Pléistocène terminal, Ibéromaurusien, Sud tunisien, Bir Oum Ali, Oued el Akarit, terre, Méditerranée.

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S19-E: Circulations des peuplements holocènes à l'interface de la Méditerranée, de l'Atlantique, du Maghreb et du Sahara

Sites néolithiques de surface du Sahara central : Résultats préliminaires du site de Taberchante (Kahlouche), Adrar, Algérie

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Lors d'une campagne de prospection préventive organisée sur le plateau de Tademaït et la vaste région de Reggane entre 2013 et 2016, de nombreux sites de surface ont été identifiés par une équipe d'archéologues du Centre National de recherche en archéologie (CNRA), accompagnée par des topographes de sociétés d'exploitation pétrolière.
Les moyens logistiques mis à la disposition des archéologues ont également permis de prospecter à l'est du grand Erg *Chech*.

Lors de cette campagne de prospection, nous avons relevé la présence de traces néolithiques tout autour de plusieurs paléo lacs au lieu-dit *Taberchante*, situé à une centaine de kilomètres au sud-ouest de la petite ville de Sali. Ce site se trouve à l'intérieur de grandes dunes qui marquent les limites orientales de l'erg *Chèche*.

Ces stations d'occupations Néolithiques révèlent un matériel lithique, en silex et en quartzite. Il est composé de lames, lamelles, perçoires, pièces géométriques, pointes de flèche, haches polies, nucleus lamellaire, etc. On note également la présence de tessons de céramique, fragments d'œufs d'autruche et de matériel de broyage (meules et molettes).

La présente communication se propose d'exposer les résultats préliminaires de notre prospection effectuée sur les marges orientales de l'erg Chèche.

Mots-Clés: Sahara central, Taberchante (Kahlouche), Sites de surface, Industrie lithique, Néolithique

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The Quaternary fauna of Algeria and its representation in rock art : Paleogeography, extinctions, survivals

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More than 130 ancient species of mammals are distributed, by the presence of bio-documents, in around a hundred Quaternary archaeological sites in Algeria. If during the Pleistocene and the Holocene, huntihg, fishing and gathering strategies are generally more documented, even if the action of carnivores is not systemastically sought in many sites, the fact remains thas the representation of wild species and domestic in rock art is insufficiently illustrated (less than 50 species). Do the animal figurations represent a selection of certain emblematic species present in the environnement (terrestrial animal, lake, amphibian, flying), or a symbolic representation such as the imposing snimal by size (aurochs, buffalo, rhinoceros, elephant, giraffe), elegance (prestigious horned antelopes), or fear (large predators) ? Obviousely, a large number of herbivore taxa, carnivores, insectivores, aquatic and flying species are absent from the bestiary of rock art representations. If some Pleistocene species will die out thanks to the optimal changes of the last glacial in Europe and its environmental repercussions in the Mediterranean and in North Africa in particular during the Neolithic subpuvial, those which are essential by their endemism in the central Sahara see their distribution geographic change bye the rise of the same time by a milderclimate with forest-gallery type vegetation around 6 000 BC. Other questions remain. What about the phulogenetic sytatus of taxa representated in the Holocene, like elephantids, girafids, camelids, equines ?

Mots-Clés: Keywords : Vertebrate fauna, rock bestiary, Saharan Atlas, Sahara, adaptation, survival

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Hunting during the Early Bronze Age in Northern Italy: new data from the archaeozoological study of the pile dwelling site of Oppeano 4C (Verona)

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During the Bronze Age in northern Italy, following the development of an economic strategy mainly centered on agriculture, hunting is significantly reduced in favor of breeding and aimed at exploiting mostly cervids (red deer, roe deer) and wild boar. New data on the exploitation of wild animals during the early Bronze Age come from the site of Oppeano 4C, a pile dwelling settlement discovered in 2015 in Vallese di Oppeano, in the Bussè valley, which represents the oldest pile-dwelling village in the Veronese Po plain dated to the ancient Bronze Age (between the end of EBA 1 and the beginning of EBA 2). From the archaeozoological analysis conducted on the finds from sector 4C, the faunal assemblage is mainly composed of domestic animals with a prevalence of pigs, followed by cattle and goats, but the exploitation, although reduced, of wild animals such as deer and roe deer is also attested, as well as occasional small prey such as beaver, badger and otter for fur recovery. The aim of this paper is therefore to provide these new data in order to analyze the role of hunting in the Early Bronze Age, compared to other contemporary sites of northern Italy.

Mots-Clés: Early Bronze Age, Pile dwelling, Northern Italy, Faunal exploitation

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Trends in Bronze Age mollusc exploitation at Larda I and Larda II (Northeast Italy)

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Archaeomalacology, the study of mollusc shells from archaeological sites, is a discipline that started in recent times, precisely from the second half of the last century. It's an essential approach to understand the human social and cultural behaviour and the dietary contribution of molluscs to human subsistence economies. Additionally, the taxonomic identification of malacological finds allows us to proceed with paleoenvironmental reconstructions, which are particularly useful for the understanding of human and environment interaction.
The examinated sites of Larda I and Larda II are located near the town of Gavello (Rovigo), in the southern part of the Veneto Region, situated in north-eastern Italy.
The first site is interpreted as a village endowed with bank and is dated between XIV-XIII B.C.. The excavations highlighted two main settlement stages: the oldest is dated between the Middle and the Recent Bronze Age, while the second one is dated to the Recent Bronze Age.
The site of Larda II is not far from the site of Larda I and the excavations revealed two settlement stages dated to the Recent Bronze Age I.
From Larda I 380 (MNI 243) malacological finds have been recovered, while only 15 finds come from the site of Larda II.
In the two sites we identified a double role for marine and freshwater molluscs. Largely, marine shells have been collected dead from the beach, as suggested by the presence of traces produced by abrasion on beaches or undertows, bioerosion and gastropod predation. Moreover, the presence of natural and anthropic holes on some *Glycymeris*'s umbos, suggests a human desire of collecting empty shells for ornamental purposes. Nevertheless, we cannot exclude a collecting for other purposes: for example, the presence of *Glycymeris* valves inside a stake-hole, could suggest a deliberate deposition of shells as a wedge.
The sample of freshwater molluscs is composed almost exclusively by fragments of *Unio*, an elongated bivalve that lives submerged in mud, probably collected along the rivers close to the sites. The high degree of fragmentation of the shells, associated with the presence of striations produced by pointed tools on the inner part of the valve, suggests a collecting for dietary purposes and, at least in part, a consumption of raw molluscs.
A furthered analysis was conducted on *Glycymeris* perforated at the umbo. We compared the archaeological holes with those associated with modern specimens collected on the beach. This comparison allowed us to identify the natural origin for almost the totality of the archaeological sample.
Nevertheless, for one of the shells, SEM analysis revealed striations around the hole, produced by scraping activity, in order to obtain a perforation.
Finally, a yellowish patina was recorded on the natural surface of a naturally perforated *Gly-*

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cymeris valve. The coloration recalls the natural colour of amber, whose manufacturing for the production of beads is documented in the near village of Campestrin during the Late Bronze Age; nevertheless, only future archaeometrical analysis will provide further information on the origin of the substance.

Mots-Clés: Archaeomalacology, Malacology, Bronze Age, Perforated shells, Traceological analysis, Shell ornaments, Mollusc exploitation

Paleogenomic analysis of archaeological leather samples from indigenous archaeological sites in Las Cañadas del Teide (Canary Islands, Spain)

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Las Cañadas del Teide National Park is located in the high mountain area of Tenerife (Canary Islands). This territory has been occupied by human populations from pre-Hispanic to modern times. Consequently, we can find ample evidence of human presence within the National Park. Although many activities were developed in this space, the most representative indigenous archaeological sites in Las Cañadas del Teide are burial caves dated between 970-1050 AD to 1500-1580 AD. Optimal conservation conditions have allowed the recovery of leather pieces that the indigenous people used to wrap up the body of their deceased. Because their livestock mainly consisted of goats, sheep and pigs, this type of material offers the possibility of using new paleogenomic techniques to determine the species from which they were obtained. However, ancient DNA extraction from leather is challenging because the tanning process strongly degrades the genetic material and further complicates analyses due to the presence of enzyme inhibitors. In this study, we tested the use of two different DNA extraction methods (Wales & Kistler (2019) and a protocol modified from Kistler (2011)) and two bioinformatic pipelines (hypothesis-free and biased approaches) to the identification of Canarian indigenous leather samples. We recovered endogenous DNA using the protocol proposed by Wales & Kistler (2019), consisting of lysis with proteinase K and phenol:chloroform purification followed by silica spin column-based purification. We successfully identify goat (*Capra hircus*) as the best candidate for the leather sample species using the hypothesis-free metagenomic analysis and thus propose this method as the most appropriate for highly degraded samples. This is, to our knowledge, the first time an ancient leather sample has been successfully identified using next-generation sequencing, highlighting its potential as an ancient DNA source. The identification of the use of goat leather by the indigenous people in Las Cañadas is in agreement with biological, ecological and cultural evidence pointing to them as the more adapted livestock to survive in this high mountain environment. This result, added to the whole set of zooarchaeological evidence, allows us to propose that goats were the animal chosen for grazing in Las Cañadas del Teide.

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Mots-Clés: Paleogenomic analysis, archaeological leather, indigenous archaeological sites, Las Cañadas del Teide, Canary Islands

SEM TECHNOLOGY FOR THE ANALYSIS OF TINY CALCIFIED REMAINS FROM A PREHISPANIC BURIAL FROM EL HIERRO (CANARY ISLANDS).

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Careful excavation of archaeological sites is a crucial procedure to obtain information about socioeconomic conditions and style of life of past populations. The recovery of seeds, phytoliths, and the remains of microfauna and microflora coupled with micro-sedimentological analyses of soil samples provides detailed information about diet and also allows radiocarbon dating. In the case of burial sites, minute calcified remains may be recovered after sieving the sediment around the corpses. Differential diagnosis constitutes a major challenge, since the list of tiny calcified structures is enormous. Some of them may belong to gallstones, renal calculi or sialoliths or may even correspond to sesamoid bones. A proper identification of the exact nature of these calcified remains is mandatory, since they may provide important insight into disease, diet, and everyday life. In recent years we have tested the ability of scanning electron microscopy (SEM) equipped with an energy-dispersive X-ray spectroscopy detector to precisely identify the composition and structure of these tiny calcified remains. In the present study we have applied this methodology to the analysis of three different small calcified structures, recovered during the excavation of a large collective prehispanic burial from El Hierro, one of the Canary Islands. The three samples (1-3), measuring 7, 12, and 6 mm, showed a relatively smooth outer surface. Spectroscopic analysis revealed that composition of sample 1 is compatible with hydroxyapatite (Ca5 (PO4)3 OH: Phosphorus= 7.15%; calcium 11.49%; oxygen =46%, with also probably some salts of magnesium (0.7%) carbonate and sodium (0.6%) bicarbonate and organic structures (collagen?). SEM image showed bony trabeculae, so, both by SEM image and chemical composition it probably corresponds to a sesamoid bone. Analyses of samples 2 and 3 are still in process, but they possibly correspond to a nephrolith and a complex mineral silicate. Thus, we confirm that SEM analysis is a useful tool in the identification of small calcified structures recovered during the excavation of a burial site.

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Mots-Clés: SEM technology, Tiny calcified remains, Prehispanic burial, Hierro, Canary Islands

The non-metric features of the calcaneus and talus in El Hormiguero

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Non-metric features consist of morphological characteristics in the bone that can be observed macroscopically and can give us information about kinship relationships and the lifestyle of past populations. El hormiguero is a pre-Hispanic archaeological site consisting of a group of six burial caves located on a cliff on the north coast of Gran Canaria in the municipality of Firgas. Of these six caves, two of them contained well-preserved calcaneus and astragalus. Therefore, a study of the non-metric features was carried out in 15 calcanea and 17 astragali from these two caves. The results show that the distribution of the non-metric traits between the two caves is entirely homogeneous. No significant difference ($P > 0.05$) was found except for one trait: The anterolateral facet of the posterior facet of the calcaneus ($P < 0.05$) with a considerably large effect size ($\phi = 0.66$), indicating a substantial difference between these two caves concerning this trait. Thus, this difference could be indicating a slight epigenetic difference between these two groups in the Hormiguero.

Mots-Clés: non, metric features, El Hormiguero

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Reprise des fouilles dans le site éponyme de Oued Djebbana, Bir El Ater, Pléistocène supérieur, Atlas Saharien Oriental ; résultats préliminaires

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Le gisement atérien de l'oued Djebbana, découvert par Reygasse en 1917, est situé à 97kms au sud de Tébessa dans l'Est algérien, à 2 km environ au Sud-ouest de la localité de Bir El Ater, aux confins de l'atlas saharien oriental dans un grand bassin quaternaire constitué de croutes calcaires. La station préhistorique est située sur la rive concave d'un méandre menacé de disparition par l'érosion, dû aux violentes crues de l'oued.
La reprise des travaux de recherches dans le site était un pas indispensable pour une meilleure lecture sur le plan paléo-environnemental, biostratigraphique et culturel. Pour cela nous avons mené deux compagnes de fouilles depuis 2019 et une prospection étalée sur tout le pourtour de djebel Onk, afin de déterminer l'origine de la matière première utilisée et taillée par les occupants du site de l'oued Dejebbana. Ce travail de recherche nous a permis d'actualiser et réviser la stratigraphie et la sédimentologie des accumulations sédimentaires des dépôts pléistocènes de cette localité préhistorique et faire une corrélation avec toutes les séquences lithologiques des dépôts des sols d'occupations sur toute l'étendue de la formation.

Mots-Clés: Atérien, Oued Djebbana, paléo, environnemental, Pléistocène, sols d'occupations

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S19-G: Historiographie des préhistoriens et paléontologues du Maghreb

Raymond Vaufrey (1890-1967), un grand préhistorien méconnu

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Initié à la préhistoire par Louis Capitan, élève de Henri Hubert au MAN, chercheur assidu au MNHN, auprès de Marcelin Boulle, Pierre Teillard de Chardin et Jean Piveteau, Raymond Vaufrey (1890-1967), après des études universitaires tardives effectuées après la première guerre mondiale, obtint en 1930 un poste de professeur à l'IPH. Il fut ainsi un des rares préhistoriens français, entre les deux guerres, à obtenir un poste lui permettant de travailler à temps plein sur la recherche préhistorique et paléontologique. Puis il entre au CNRS en 1937, dont il est un des premiers préhistoriens et est nommé directeur à l'EPHE en 1942. A partir de 1931, il est co-rédacteur en chef de la revue " l'*Anthropologie* ", dont il animera la publication jusqu'à son décès. Il est également depuis 1932, le représentant pour la France de l'UISPP.
Ses premières publications : " *Le paléolithique italien* " (1928), *" Les éléphants nains des îles méditerranéennes et la question des isthmes pléistocènes* " (thèse soutenue en 1929), le mettent déjà au premier plan. Il se spécialise alors sur l'Afrique du Nord : l'Ibéromaurusien (1932), le Capsien, " *l'Art rupestre nord-africain* " (1939), " *La préhistoire de l'Afrique "* (en deux tomes 1955 et posthume).
Cette contribution s'attachera plus particulièrement à la contribution de Raymond Vaufrey à la préhistoire de l'Afrique du Nord, et dans ses relations avec le monde méditerranéen.

Mots-Clés: préhistoire, historiographie, Afrique du Nord

*Intervenant

Les apports de Théodore Monod à la connaissance des expressions rupestres du Sahara

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De 1929 à 1951, Théodore Monod s'est appliqué à étudier quelques 2.700 gravures, 160 peintures et 500 inscriptions rupestres, la plupart ayant été relevées par ses soins dans l'Ahnet en Algérie, puis dans le Sahara mauritanien et, le temps d'un séjour, dans le Nord Tibesti.
Ses découvertes et la prise en compte de celles de ses collègues réalisées parallèlement, lui ont permis d'établir une chronologie relative des expressions rupestres sahariennes toujours valide dans ses grandes lignes.
Il restera à la pointe des connaissances en art rupestre saharien durant vingt deux ans, avant qu'Henri Lhote ne lui succède ; ce dernier n'aura alors cesse de souligner la pertinence des travaux de son prédécesseur.

Mots-Clés: Sahara, Expressions rupestres, Chronologie relative, Historiographie

*Intervenant

Fethi Amani **1, *, @**, Abdelouahed Ben-Ncer **1, @**

1 : INSAP

* : Auteur correspondant

Sur le terrain, les travaux d'Ennouchi ont débuté en 1926 par l'étude des mammifères provenant du gisement de Grive-St-Alban en France. Ils s'inscrivaient dans le cadre de préparation de diplôme d'études supérieures des sciences naturelles. Sous la direction du Pr.Ch. Depret, Ennouchi publia les résultats de ses travaux de thèse de doctorat en 1930. Ils étaient consacrés à l'étude de la faune du Tortonien de ce même site. Installé au Maroc, Ennouchi a obtenu un poste d'Enseignant-chercheur à l'Institut scientifique de Rabat en 1947. Un an après, et en collaboration avec M.GIGOUT, il contribue à la création du premier certificat de licence de Géologie au Maroc. Ennouchi a toujours essayé de concilier entre ses devoirs d'enseignant et de chercheur. Passionné par la Paléontologie, il avait noué d'étroites collaborations avec d'éminents scientifiques, notamment, les Professeurs C. Arambourg, J. Piveteau et Lehman. Les travaux d'Ennouchi s'étaient focalisés sur les mammifères quaternaires du Maroc et de leur contribution à la connaissance des paléoenvironnements. Sur plus de quarante années de recherches, d'innombrables gisements fossilifères ont été mis au jour sur le littoral atlantique, depuis Larache au nord jusqu'à Agadir au sud et de Rabat à l'ouest aux confins des villes d'Oujda et de Guercif à l'est. De nombreuses collections de restes fossiles, notamment des dents de mastodontes d'éléphants, de rhinocéros blancs, de chevaux et d'autres taxons de mammifères méticuleusement exposés dans des meubles et vitrines d'une salle de la faculté des sciences de Rabat. On y observe aussi de belles dents de vertébrés marins, raies et de requins provenant des phosphates et les moules d'empreintes fossiles de pas de dinosaures (Demnat). Plus d'une centaine de publications dans des revues scientifiques nationales et internationales. Il a également participé à de nombreuses manifestations scientifiques de vulgarisation et autres notamment des colloques et congrès. C'est à Ennouchi que revient le mérite d'avoir découvert au début des années soixante du siècle dernier, les premiers fossiles humains, du célèbre site de Jebel Irhoud à El Youssoufia, accompagnés d'une industrie moustérienne et d'une faune pléistocène.

Georges Barthélemy Médéric Flamand, géologue et préhistorien. Grand découvreur des " hadjrates maktoubates " de l'Atlas saharien.

Iddir Amara * [1]

[1] Institut archéologie – Algérie

Cette communication retrace l'apport scientifique de G.B.M. Flamand à la Géologie et la Préhistoire atlasique et saharienne. Il est né à Paris le 9 février 1861 et mort à Alger le 14 décembre 1919. C'est en tant que préparateur à l'Ecole supérieure des Sciences d'Alger qu'il regagne l'Algérie après avoir un temps, passé par le Muséum national d'Histoire naturelle de Paris. Son passage à l'Ecole des Sciences d'Alger sous la direction d'Auguste Pomel fut bénéfique puisque depuis l'inauguration de ses bâtiments sur les camps d'Isly en 1887, Flamand fut chargé de cours de Géographie physique du Sahara. Il a fourni une collaboration active à la carte géologique. C'est en devenant directeur du Service géologique des Territoires du Sud en 1904, qu'il soutient une thèse de doctorat et pouvoir poursuivre ses recherches sur la Géologie et la Préhistoire sahariennes. C'est le premier à avoir proposé le découpage chronologique de l'art préhistorique du Sahara. Il est mort prématurément avant la publication de sa grande monographie sur les " Hadjrat el Maktouba ". Stéphane Gsell avait assuré la publication posthume de ce livre de référence.

Mots-Clés: Mots, clés : Atlas saharien, Sahara, carte géologique, art préhistorique.

*Intervenant

Leo Frobenius (1873-1938) : explorateur et découvreur de cultures africaines

Iddir Amara *† [1]

[1] Institut archéologie – Algérie

La communication retrace l'apport scientifique de Leo Frobenius parti sur les traces de ses prédécesseurs découvrir le continent africain. En 1904, il part en mission à la découverte de l'Afrique colonisée par l'Europe. En parfait ethnologue, il avait ramassé de nombreux contes et mythes anciens des régions qu'il avait parcourues.
Leo Frobenius est né à Berlin le 29 juin 1873, mort à Biganzolo le 9 août 1938 et inhumé au cimetière principal de Francfort. C'est en tant qu'ethnologue et archéologue allemand, qu'il a décidé de partir à la découverte du continent africain. Au début du XXe siècle, il a commencé son premier voyage dans le Kassaï congolais, ancienne colonie belge. Volontairement, il avait choisi de ne pas se documenter, pour éviter toute forme de pollution intellectuelle. Il avait poursuivi jusqu'en 1918 sa mission en Afrique du Nord (Algérie) et Afrique de l'Est (Soudan). En Algérie, il était accompagné par Henri Obermaier et d'artistes plasticiens qui avaient comme mission la reproduction des nombreuses figures d'art rupestre.

En 1920, Leo Frobenius retourne en Allemagne, fonde l'Institut d'ethnologie " la Morphologie culturelle " à Munich. En 1932, il devient professeur honoraire de l'Université de Francfort, et en 1935 nommé directeur du musée ethnographique dans la même ville.

Leo Frobenius est le premier ethnologue à défendre l'Afrique contre les méfaits du colonialisme. Il devient ainsi le premier africaniste. Les africains défenseurs de la liberté comme Léopold Sédar Senghor, ou l'écrivain antillais Aimé Césaire parlent de l'Afrique et de la négritude en s'appuyant sur les travaux de Frobenius.
Frobenius était parmi les premiers à avoir condamné le colonialisme. Aujourd'hui, Frobenius-Institut gardien de la mémoire de l'ethnologue, perpétue ses idées africanistes.

Mots-Clés: Mots, clés : Afrique, ethnologue, négritude, art préhistorique.

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Jean Pierre Savary, Géologue, passionné de l'archéologie et pionnier de la photographie aérienne au Sahara

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Après des études post-bac de Géologie, Jean Pierre Savary consacre une année au Musée de l'Homme à Paris pour obtenir le Certificat d'Ethnologie et Préhistoire, sous la direction d'André Leroi-Gourhan. Il s'engage en 1957 comme jeune Ingénieur Géologue à la Société pétrolière SNREPAL à Alger pour diriger sur place la conduite de forages. Il commence ainsi sur le 3eme puits du gisement de gaz d'Hassi R'mel, puis passe 3 mois en Allemagne pour effectuer son service militaire, et 6 mois à l'école d'officiers du Génie à Angers.
Savary demande une affectation au Sahara où il dirige une équipe de 20 appelés pour continuer la construction de *bordj* (fort) Thriet pour Méharistes.

Après un petit séjour passé à Ouargla, il regagne la SNREPAL en 1961 pour diriger durant 4 ans les forages du gisement d'Hassi Messaoud avant de partir à Alger pour occuper divers postes administratifs.

Jean Pierre Savary considère l'Algérie comme un paradis pour son climat merveilleux, le travail professionnel et les recherches ethnologiques et préhistoriques qu'il avait pu y mener en liaison avec le CRAPE (actuel CNRPAH). Géologue, Savary est très ouvert à la pluridisciplinarité comme en témoignent les nombreux articles publiés dans la revue Libyca et le Bulletin de la Société Préhistoriques Françaises (BSPF) de 1955 à 1968.

C'est bien à lui que revient le mérite d'avoir appliqué pour la première fois (au début des années soixante) la photographie aérienne à l'étude des monuments funéraires de la Tassili du *Fadnoun*. Il réunit les résultats de ses analyses qu'il concrétise par un mémoire de synthèse publié en 1966. Cette étude consciencieuse et fructueuse est restée malgré son ancienneté, une référence indéniable pour de nombreux chercheurs du funéraire. Elle a aussi guidé mes premiers pas dans ce grand massif saharien de l'*Azger* et servi de base indispensable dans le cadre de ma thèse de doctorat.

Mots-Clés: Sahara central, Jean Pierre Savary, Géologie, préhistoire, photographie aérienne.

*Intervenant

Louis Gentil (1868-1925), un Géologue audacieux passionné par le Maghreb (Maroc et Algérie)

Youcef Sam * [1]

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Se fiant à la grande connaissance de la langue locale et des coutumes de l'Islam qu'il a acquise durant sa jeunesse en Algérie (né à Alger en 1868), Louis Gentil (il se faisait appeler Si Allal), homme de terrain habile et courageux a parcouru en pèlerin musulman des milliers de kilomètres au profit de la Science en Algérie (Oranie) entre 1896 et 1901et au Maroc de 1904 jusqu'à sa mort en 1925 (il a traversé six fois le haut Atlas, 1800 kilomètres d'itinéraires relevés dans des territoires qu'aucun chercheur n'avait alors parcourus). De ces singulières explorations, des résultats admirables furent obtenus tels que, pour ne citer que quelques uns, la découverte d'un grand volcan tertiaire dans le massif du Siroua (Maroc), relief montagneux presque inconnu à l'époque, ou encore la station préhistorique du lac karâr (Tlemcen, Algérie), site Acheuléen d'importance en Afrique du Nord. Devenu maître de conférence en Géologie dès 1902 après la soutenance d'un doctorat à la Sorbonne et élu en 1923 membre de l'Académie des sciences (section de Géographie et de navigation) il est l'auteur de plusieurs ouvrages importants dont " L'étude Géologique du bassin de la Tafna " (1903) ou encore " Le Maroc Physique " (1912). Explorateur né et ne sachant pas résister à l'appel du terrain Maghrébin a qui il a donné tant, il finit par lui donner sa vie lors d'une dernière exploration en 1925. La ville de Youssoufia au Maroc s'est longtemps appelée " Louis Gentil " et actuellement le square " Louis Gentil " à Paris porte toujours le nom de ce savant. Enfin, un *Grand prix Louis Gentil - Jacques Bourcart* est attribué chaque année par l'Académie des sciences depuis 2007 pour récompenser des chercheurs de moins de 40 ans ayant effectué des recherches à l'étranger dans le domaine des sciences de la terre.

Mots-Clés: Louis Gentil, Exploration, Géologie, Préhistoire, Haut Atlas, Maroc, Algérie

*Intervenant

Le docteur Jean Dastugue (1910-1996), où la rigueur de l'anatomie humaine.

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Le docteur Jean Dastugue a eu deux carrières professionnelles et scientifiques. La première en tant que chirurgien orthopédiste dès les années trente, la seconde à partir de 1957 en tant que paléopathologiste. Et c'est cette seconde période qui fut la plus enrichissante pour lui, où pendant quarante années, il a étudié plusieurs collections anthropologiques de par le monde. Véritable successeur du Dr Léon Pales, il fut le seul à relancer le débat sur les principales affections de l'homme préhistorique. Parallèlement à ses activités de chercheur, il dut remplir ses missions d'enseignement en anatomie et directeur de l'Institut d'Anthropologie de la faculté de médecine de Caen, créé par lui en 1959.
Ses travaux ont longtemps porté sur les populations Sapiens du Paléolithique supérieur et du Néolithique d'Afrique du Nord (Taforalt au Maroc en 1963, Columnata en 1970, région d'Alger en 1973, Afalou Bou-Rhummel en 1975, en Algérie).

Les quatre dernières années avant sa mort ont été pour nous (Philippe Andrieux, directeur du Laboratoire du Val de Marne et moi-même) une chance de pouvoir travailler avec lui, puisque nous l'avons hébergé dans notre laboratoire afin qu'il puisse achever son étude sur la collection funéraire de La Queue-en-Brie. Ni son caractère ombrageux, ni ses critiques sévères sur la terminologie anatomique, parfois non conforme à sa réflexion sur le bipède normal, anormal et pathologique n'ont été un frein pour nous. Bien au contraire notre collaboration nous avait amenés sur un terrain de dialogues et de débats d'un grand enrichissement, où le discours en réunion, à deux ou à dix, était plutôt celui du professeur et de l'élève. Les démonstrations étiopathogéniques de la luxation congénitale de la hanche et son diagnostic différentiel avec la luxation traumatique ou les multiples vestiges de la trépanation crânienne en valaient la peine.

Mots-Clés: Anatomie humaine, anthropobiologie, paléopathologie, Afrique du Nord.

*Intervenant

Maurice Reygasse

Ginette Aumassip * [1]

[1] centre national recherche anthropologique prehistorique historique – Algérie

Maurice Reygasse Souvent oublié, il est pourtant associé aux plus célèbres sites de la préhistoire nord-africaine, il a créé le Musée du Bardo à Alger et a fait bénéficier l'université d'Alger d'un des tout premiers enseignements de préhistoire du monde. Originaire du Lot (France), des études d'arabe et d'abyssin à l'Ecole des langues orientales, l'avaient conduit comme administrateur dans le Constantinois vers 1910. Nul ne s'étonnera dès lors que son nom reste surtout attaché au Capsien et à l'Atérien qu'il dénomma. La liste de ses découvertes et de ses fouilles est longue, marquée par les noms de Bir el Ater, Cheria... En tant que conservateur du Musée du Bardo, ses travaux le conduisirent au Sahara et aux sites de Tihodaïne, Abd el Adhim, Oued Asriouel... Il participa et/ou dirigea les fouilles du mausolée d'Abalessa, attribué à Tin Hinan, reine berbère, ancêtre présumée des nobles touaregs.

Mots-Clés: Atérien, Capsien, Acheuléen, Moustérien, Monument, Tin Hinan, Musée

*Intervenant

Henriette Camps-Fabrer et Gabriel Camps

Ginette Aumassip * [1]

[1] centre national recherche anthropologique prehistorique historique – Algérie

Il n'est pas exceptionnel de trouver des couples dans les grands noms de la Préhistoire, G. et H. Camps sont de ceux-là. Nés tous deux en Algérie, ils y exercèrent une bonne part de leurs activités avant de la reporter sur le sud-est français où, ensemble, parmi nombre d'autres travaux, ils mirent en chantier un Atlas préhistorique du midi méditerranéen. G. Camps occupa la chaire de Préhistoire de l'université d'Alger, tout en assumant la direction du CRAPE et du Musée du Bardo à Alger, puis la chaire de Préhistoire d'Aix-en-Provence, créée pour lui, et fonde un laboratoire, le LAPEMO. Spécialiste de Protohistoire, il fit valoir l'existence d'un Age du Bronze en Afrique du Nord, s'intéressa plus particulièrement aux périodes récentes de la Préhistoire, surtout au Capsien. On lui doit de très nombreuses publications qui soulignent l'attention toute particulière qu'il accordait au monde berbère et qui retentit dans la création de l'*Encyclopédie berbère*. Membre de nombreuses commissions, il fut très épaulé par son épouse Henriette, personnalité des plus attachantes, dont les apports en méthodologie sont fondamentaux. Ses travaux appuyés sur l'Ethnographie ont conduit en Algérie à la renaissance de l'artisanat traditionnel plus particulièrement des bijoux dont elle était la spécialiste la plus éminente, ceux sur l'industrie osseuse dont elle était aussi l'une des meilleures spécialistes, sont à l'origine de la Commission de nomenclature sur l'industrie de l'os préhistorique, Commission qu'elle a su maintenir durant de longues années.

Mots-Clés: Préhistoire, Protohistoire, Atlas, Méthodologie, Berbère, Bronze, Funéraire, Parure, Os, Capsien

*Intervenant

Apport de Georges Choubert (1908-1986) à la Géologie du Quaternaire

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Par la diversité de ses formations géologiques et par sa proximité de l'Europe ; le Maroc a attiré beaucoup de géologue et de préhistoriens dès le début du XIX siècle. L'établissement du protectorat français sur le Maroc en 1912 a permis à plusieurs chercheurs français d'entamer des investigations géologiques sur le Maroc en sécurité. Georges Choubert a d'abord été chargé de réaliser des relevés dans la Méseta orientale (Rekame et les Hauts Plateaux) région déjà étudiée par son prédécesseur Philipe Russo (1926), Il a également le mérite de réaliser des cartes au 1/500 000 comme la feuille d'Oujda (1951-1954).
Le plus grand travail de Georges Choubert fut mené sur l'Anti-Atlas. L'ensemble de ses travaux sur cette zone ont fait l'objet d'un travail de thèse qu'il avait soutenu en 1960 et publiée en 1963 et ensuite il a eu la responsabilité du programme de la cartographie géologique du Maroc (1908-1986). Avec l'arrivée des photos aériennes en 1950, on assiste à la réalisation de beaucoup de cartes géologiques au 1/500 000 et c'est grâce à ses études sur le Précambrien qu'il créa à la direction de la Géologie de Rabat un Laboratoire de Géochronologie.

La géologie du Quaternaire a attiré beaucoup l'attention de Choubert, et en particulier les formations continentales. En 1946, sa première note a été consacrée à la discussion du mode et l'âge des dépôts rougeâtres au pays de Chaouia, de Doukkla. Avec les multiples travaux de Bourcart, Raynal, Gigout et bien d'autres géologues et géomorphologues entre les années 30 et 50, Choubert en 1956 propose pour la première fois un cadre chronostratigraphique du Quaternaire continental. Ce cadre n'as pas été définitif mais il a été une base de référence et de revisites par Choubert lui-même et par ses collègues (ex. : Choubert et al.,1959 ; Beaudet et al., 1967 ; Weisrock, 1983 ; Texier et al., 1985).
Le Quaternaire marin du Maroc et la chronologie de certains sites archéologiques et paléontologiques ont bénéficiés de plusieurs contributions de Choubert. C'est à lui le mérite de la création de l'étage Moghrébien en 1946, et la précision de l'âge relative des certaines formations littorales et fluviatiles sur la bande côtière de Rabat et son arrière-pays (ex : Choubert et Marcais, 1947 ; Choubert, 1962 ; Arambourg et Choubert, 1964).

Mots-Clés: Choubert, Quaternaire continental, Cartographie, Préhistoire, Maroc

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Ginette Aumassip, la préhistorienne algérienne

Nagète Aïn-Séba * [1]

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Arrivée de sa Dordogne natale en octobre 1956, Ginette prends son premier poste en Algérie en tant que professeure de Sciences naturelles à Tizi Ouzou. Avec l'indépendance, elle se formera à la préhistoire en rejoignant le Centre de Recherches d'Anthropologie, de Préhistoire et d'Ethnologie (CRAPE) et en intégrant l'équipe des Camps. D'emblée, elle s'intéressera aux régions sahariennes et mènera à bien un doctorat sur la préhistoire du Bas-Sahara avant d'élargir ses recherches aux questions de néolithique sur l'ensemble du territoire et de sa problématique. Avec Mouloud Mammeri, elle aura à cœur de former une nouvelle génération de préhistoriens et par ailleurs de transmettre, par le biais d'un enseignement en géologie du quaternaire à l'université de Bab Zouar. Poursuivant ses recherches du néolithique saharien, notamment par la fouille du site de Tin Hanakaten, sa connaissance approfondie de tous les aspects de la préhistoire algérienne, maghrébine, saharienne, la pousseront à être l'autrice de plusieurs synthèses incontournables sur la préhistoire régionale ainsi que d'ouvrages ouverts à un public plus large, notamment sur l'art rupestre saharien. Enfin, après avoir supervisé pendant des années la revue Libyca, elle a été co-fondatrice et est toujours co-directrice de la revue Ikosim, née en 2012.

Mots-Clés: Néolithique, Sahara, Bas, Sahara, Tin Hanakaten, Algérie, Libyca, préhistoire

*Intervenant

L'Abbé Jean Roche (1913-2008) et le Paléolithique supérieur du Maroc

Abdeljalil Bouzouggar * [1]

[1] Institut National des Sciences de l'Archéologie et du Patrimoine – Maroc

L'Abbé Jean Roche né à Paris en 1913 est un préhistorien qui a mené de grandes recherches sur le Paléolithique supréieur du Maroc.
En 1950, poussé par le souhait de poursuivre l'oeuvre de l'Abbé Breuil, Jean Roche a effectué ses premières fouilles au Portugal dans deux sites : Vila Pouca et Pinhal de Charneca. Il a également étudié et publié la série lithique du site de Casa da Moura. S'ensuivit une série de recherches dans d'autres grottes à l'exemple de celles d'Oeiras et de Salemas.

Au Maroc, l'Abbé Jean Roche en tant que directeur de la mission archéologique, a effectué des fouilles dans la grotte des Contrebandiers (region de Témara) et des Pigeons à Taforalt. Ce dernier site a occupé une place importante dans sa publication majeure parue en 1963, *L'Épipaléolithique Marocain* et qui a été le sujet de sa thèse.
Il est vrai que certaines des interprétations de l'Abbé Jean Roche ont été revues à la lumière du développement des datations, mais son travail et la documentation de ses fouilles ont grandement contribué à mieux comprendre le Paléolithique supérieur du Maroc.

Mots-Clés: Abbé Jean Riche, Paléolithique supérieur, Grotte des Pigeons, Maroc

*Intervenant

Arthur Debruge (1864-1948): un préhistorien controversé.

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Souvent critiqué par ses contemporains comme par ses successeurs, Arthur Debruge, postier de métier, fut un infatigable inventeur ou fouilleur de sites en particulier dans l'est algérien. De 1897 à 1930, il prospecte et fouille sur un vaste territoire : Sour El Ghozlane, Béjaia, Constantine, Mila, Batna, Tébessa et même dans le grand sud à Tihodaine. Il collabore à la Mission du Logan Muséum à partir de 1925 et est un membre actif de la Société archéologique de Constantine.
A la différence de certains de ses contemporains, il publie chacune de ses missions notamment des articles sur les sites de Ali Bacha, Mechta el Arbi, Bouzabaouine, la Grotte des ours, el Oubira et tant d'escargotières et d'abris sous roche. Bien que ses méthodes de fouille soient hautement critiquables, ses écrits constituent une source d'information non négligeable pour des sites qui ne peuvent plus être repris. Auteur de théories parfois farfelues –néandertaloïdes à Mechta El Arbi-, il a le mérite de critiquer la position de Paul Pallary sur le " Néolithique Berbère " et d'avoir vu juste –bien avant Reygasse- sur le caractère paléolithique des pièces pédonculées atériennes. Correspondant de la Société préhistorique française dès 1912, il se retire dans les années quarante à Skikda où il décède le 03 juin 1948.

Mots-Clés: Historiographie, préhistoire, Algérie, exploration, fouilles

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S20-B: Reconstructing socio-economic and cultural dynamics from the Sahara to Mediterranean Africa during the Holocene

Regards croisés sur le rôle du Sahara marocain dans le développement du négoce transsaharien à l'époque médiévale : Approche diachronique

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La région transsaharienne, de par son rôle de trait d'union entre le nord et le sud, a connu lors de l'époque médiévale son ère la plus florissante en termes de négoce, ce qui a accordé au Sahara marocain un statut de carrefour commercial inéluctable outre un rôle déterminant dans l'intronisation de la religion de l'islam dans la région sahélienne. Toutefois, de nos jours, les cités sahariennes disséminatrices de ce commerce et ce durant des siècles, à l'instar de Sijilmassa, Fès et Tombouctou, ancienne cité gouvernée par le Maroc durant environ deux siècles, ne connaissent pas le même essor comparativement à leur âge d'or, victimes de leur rayonnement qui a attiré la convoitise et la prédation de nombreux antagonistes en quête de cités stratégiques et de puissance. Conséquemment, la présente recherche apportera un éclairage diachronique sur les pratiques commerciales de l'époque à travers l'analyse du rôle du Sahara en tant que zone polymorphe, d'importation, d'exportation, de transit, d'escale et de ravitaillement aussi bien de marchandises que d'idée et de cultures. L'étude s'évertuera également à analyser l'évolution de la nature des biens échangés en mettant au diapason le contexte historique.

Mots-Clés: Maroc, Afrique subsaharienne, Sahara marocain, Commerce caravanier, Âge médiéval

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Quel regard porté sur les ovales bi-ponctués représentés dans les gravures rupestres de l'Adrar des Iforas (Mali) ?

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Soixante-deux motifs sub-ovalaires à sub-rectangulaires décorés de deux ponctuations pour plus de la moitié d'entre eux, se trouvent gravés sur les granites de l'Adrar des Iforas, un massif situé au nord-est du Mali en zone saharo-sahélienne. Des motifs comparables sont connus dans les gravures rupestres du Sahara marocain, algérien, libyen et nigérien. Leur vaste distribution étonne autant que leur forme intrigue. Que représentent ces pétroglyphes ? À quelle(s) époque(s) et à quel(s) contexte(s) socioéconomique(s) rattacher leur réalisation ? Leurs caractères propres alliés à des données archéologiques fournissent des éléments de réponse qui, eux-mêmes, orientent les réflexions vers deux autres domaines : d'un côté vers les figures anthropomorphes de la protohistoire européenne sud-occidentale, de l'autre vers les représentations mentales que les sociétés de l'Afrique subtropicale se font du corps humain de sa conception à sa disparition et, parallèlement, des entités invisibles – génies, ancêtres, âmes des défunts, doubles des personnes – censées commander aux destinées individuelles et collectives. Ces approches croisées transforment le regard et ouvrent à des interprétations qui s'éloignent des lectures qui ont été proposées jusqu'ici.

Mots-Clés: Protohistoire, Anthropomorphisme, Relations à grande distance, Permanences culturelles

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Neolithic human occupation in the North Western Sahara: Mauritania as a case study

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Mauritania is located in a moderate point among Sahara, North and Western Africa. Through archaeological research, a better understanding of the human past life during prehistory in Mauritania can be accomplished, which is considered a remarkable example as Paleolithic, Neolithic, and Chalcolithic are represented.
Neolithic life can be traced through the evidence: archaeological remains, cultural materials, fauna, flora, and rock art in different regions in Mauritania: Sahel Region: Nouakchott, Argin Basin where marine settlement middens, Western Mauritania: continuous human settlements in Khatt Lematig, South Eastern Mauritania: Tichitt and Walatta Dhars which is considered as a later Neolithic human settlement adopted Millet cultivation, in addition to numerous rock art stations all over Mauritania.
Mauritania The paper aims to highlight the Neolithic lifestyle and human adaption characteristics in Mauritania based on the available archaeological resources as an example of the Neolithic human occupation as an example of the human occupation in Western Sahara during Neolithic.

Mots-Clés: Neolithic Communities, Sahara, Climate Change, Prehistoric Mauritania

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Pots and bones: taphonomic and spatial analyses of the Middle Holocene pastoral occupation at Takarkori rock shelter (Tadrart Acacus, Libya).

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A quarter of a century after the seminal publication by Chang and Koster (1996) on the "archaeology of pastoralism", the quest for the "unambiguously" differentiation and identification of pastoral sites is still challenging. This is especially true for sites characterized by numerous, multi-phased occupations resulting in a palimpsest layout hard to disentangle and difficult to explore.
The archaeological landscape of the Tadrart Acacus massif (SW Libya, Central Sahara) is made of sites that shown cultural-specific settlement and economic strategies stretching over millennia of occupation. Caves and rock shelters, in particular, represent an important part of the landscape exploited by mobile prehistoric herders in their seasonal mobility patterns system. These types of contexts are affected by numerous natural and anthropogenic factors that regulate the formation processes of the archaeological deposits. In this regard, the site of Takarkori in the southern Acacus, thanks to its well-preserved archaeological record, represents a highly valuable archive of past societal activities.
Here we show the taphonomic and spatial analyses of pottery and faunal remains dated to the Middle Pastoral (7100-5600 cal BP). The study of diverse taphonomic categories (i.e. fragmentation, burning, weathering, etc.) on organic (fauna) and inorganic (ceramics) remains, of their spatial distribution in the archaeological contexts and their association with features like pits, hearths or stone structures allows to assess the multiple depositional and post-depositional processes responsible for the composition and organization of archaeological material. This integrated approach moreover sheds light on site occupation, space management and use in the frame of the pastoral groups' settlement strategies in the region, where seasonal mobility represents a key adaptation coping climatic and environmental instability.

Mots-Clés: Sahara, Middle Pastoral Neolithic, formation processes, taphonomy, spatial distribution

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La caractérisation morpho-stylistique de la poterie de la grotte néolithique de Gueldaman GLD1 : Nouvelle réflexion sur le Néolithique tellien (Nord de l'Algérie).

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Le remplissage de la grotte de Gueldaman GLD1, fossilise une occupation humaine néolithique, datée entre VIII-V millénaire BP. Ce niveau archéologique a livré une production culturelle riche et variée (industrie lithique et osseuse et de la céramique). Le mode vie de ces groupes humains est traduit également par la découverte de restes de blé, de résidus de lait et ainsi que du miel. L'identification des espèces comme *Ovis/Capra* suggère l'activité de domestication et plaide pour un mode de vie semi-pastoral.
L'analyse de la poterie découverte dans les différents niveaux archéologiques, montre une évolution morpho-stylistique de la poterie et sa chronologie culturelle. L'examen de l'aspect stylistique, basé sur une méthodologie empirique et expérimentale a révélé des formes simples et composées des récipients et un décor utilisant différentes techniques (impression, incision et peinture).

Les différentes données obtenues permettront certainement de comparer le néolithique tellien de GLD1 avec les autres faciès néolithiques, soit au niveau régional ou à l'échelle du bassin méditerranéen.
Cette approche s'articulera sur le comportement des différents groupes néolithiques dans ce vaste territoire en mettant en avant les zones d'échange et d'influence.

Mots-Clés: Poterie, morphologie, décor, Néolithique, GLD1, Algérie.

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Palaeoenvironment and plant use in the Upper Capsian: macro-botanical and micro-botanical remains from Kef Hamda (Tunisia).

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Kef Hamda is an open-air site located on a 35 x 10 m terrace along the El Garia crest of the Tunisian Ridge, at 700 m a.s.l. The site was discovered in 1973, and has been the focus of renewed archaeological excavations in 2014. It is dated between the 9 – 8th millennium cal BP, with evidence of a lithic complex belonging to the Upper Capsian. Systematic integrated analyses of macro-plant (seeds and wood charcoal) and microfossils (phytoliths and calcitic wood ash pseudomorphs) have yielded a rich assemblage that provide a varied range of data on the palaeoenvironment and the use of plants for consumption, fuel and basketry, among other uses. Charcoal remains show that the most used wood for fuel was Aleppo pine (*Pinus halepensis*),

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but other species such as *Rhamnus/Phillyrea, Juniperus/Tetraclinis* or strawberry tree (*Arbutus unedo)*, among others less frequently collected, were also used. This record indicates that the fuel collection was carried out within of scrubland Mediterranean formations. As for seed remains, preliminary results point to the collection of several food plants such as wild legumes (*Lathyrus/Vicia* sp.), acorns (*Quercus* sp.), Aleppo pine nuts (*Pinus halepensis*), juniper (*Juniperus* sp.), lentisk (*Pistacia lentiscus*) and elderberry (*Sambucus* sp.). In addition, macro and microfossils of Alfa grass (*Stipa tenacissima*) suggest that this plant could be used to produce basketry and other craft items, such as mats, cords, and containers. Further, no crop seeds or domesticate animals have been recorded, in spite that pottery fragments were identified in the late occupation of the site, suggesting that wild plants played an important role in the subsistence of Capsian foragers in spite of the introduction of technological innovations linked to the Neolithic.

Mots-Clés: Archaeobotany, Capsian, Tunisia, Vegetation, Plant food, Basketry

Residential Mobility and Sedentism from Early to Mid-Holocene in the Oases and the Egyptian Western Desert

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The structural arrangements shared by the main habitation clusters of the Egyptian Western Desert, from the Nabta Playa region on the southern border, to the oases further north (Kharga, Dakhla,Farafra), reveal indisputable signs of a progressively more intense and prolonged presence of human groups in the various areas. This process follows shortly after the reoccupation of the Egyptian Sahara at the end of the Younger Dryas (11,500 cal BP) and accelerates during the Middle Holocene (between ca 8100 to 7700- 7300 cal BP). Some indicators of the intensive use of the territories, and of the consequent increasing stability, may be the abundance of abandoned artefacts, the presence of heavy and difficult to transport tools (e.g. millstones), the proximity to sources of raw materials, the importance of stratified deposits and the abundance of meal residues (floral and faunal remains) but, above all, stone buildings indicating expenditure of labor work. One of the most important indicators is undoubtedly the presence of large settlements, sometimes taking the form of villages, which arose in relation to water basins and the supply areas of local resources, stone raw materials and, above all, plant resources. Although settlement organization may have been influenced by the characteristics of the environment, it also reflects conditions of a social and cultural nature. Settlement pattern, rather than the study of the artefacts it returns, allows us to understand the situation in which human activities took place. The paper dwells on these issues, noting the chronological and hierarchical relationships that can be established between the different habitation nuclei of the Egyptian Western Desert and the consequences that these social entities may have had in relation to the Nile Valley Neolithic communities.

Mots-Clés: Egyptian Sahara, Holocene, environment, sedentism, social organization, cultural exchanges

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Swimmers and Archers in context: Archaeological investigations along the Wadi Sura, Gilf Kebir, Egypt

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This communication presents the results of fieldwork and analyses carried out by the Gilf Kebir Archaeological and Conservation Project in the framework of the Italian-Egyptian Environmental Cooperation. In 2010 a programme of conservation of the caves with prehistoric rock art located along Wadi Sura, Gilf Kebir Plateau (Egypt) was launched. Here we present the results of: 1) the excavation of the Cave of Swimmers deposit; 2) the technological and functional studies of the lithic and ostrich eggshell artefacts; 3) the digital restoration of the caves' rock art images. The caves of Swimmers and Archers are two shallow shelters that open in the Palaeozoic sandstone at the southwestern foot slope of the Abu Ras plateau, northwestern Gilf. During fieldwork seasons carried out between 2010 and 2013, archaeological investigations dealt primarily with both the inventory and documentation of the rock art motifs and the excavation of the Cave of Swimmers deposit. The excavations revealed a regular hardened sandstone bedrock which was likely used as an occupation floor by the groups populating the area. Sub-circular pits cut into this bedrock floor were possibly used as grinding pits. The deposits yielded microlithic artefacts, almost all of which were manufactured from small quartz pebbles. Use-wear analysis carried out on silicone moulds of a selection of the microlithic tools facilitated interpretations of their functions. Besides lithic artefacts, ostrich eggshell sherds were also recovered, some of which derive from different stages of bead production. The excavations also revealed a group of painting and stationery items (watercolour tubes, drawing pins, etc.) that had likely been used by the DIAFE expeditions' members in the 1930s. These modern items shed light on the history of explorations in the area. The rock art images, which are currently seriously weathered, run along the walls inside the two caves. They can be dated to both the Gilf B (6600-4400 cal. BC) and Gilf C phases (4400-3500 cal. BC). Digital images of the rock art images were enhanced using *D-Stretch* software which allowed better characterisation of the images, and an in-depth understanding of the stratigraphic relations that link the images, especially those belonging to different styles.

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Mots-Clés: Holocene, Eastern Sahara, Caves of Swimmers and Archers, Rock art analysis, Techno functional analysis

Les modalités d'exploitation des caprinés domestiques dans la grotte préhistorique de Amoura (Atlas Saharien Oriental, Algérie).

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Ce présent travail concerne l'analyse archéozoologique des restes fauniques des mammifères recueillis dans les différents niveaux successifs Holocène, de la grotte préhistorique de Amoura. L'étude de ce matériel faunique a permis tout d'abord de dresser la première liste faunique de ce site. En outre, l'observation des différentes marques et modifications des surfaces osseuses, ainsi que l'analyse des courbes d'abattage et la représentation des éléments anatomiques ont contribuées à mieux cerner les comportements de subsistances et les modalités d'exploitation de ces caprinés domestiques, qui constituaient le principal apport carné des populations néolithiques de Amoura.

Mots-Clés: Archéozoologie, Holocène, grotte Amoura, Comportements de subsistance, Caprinés domestiques, Algérie.

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Frankincense, incense burners and rising power in prehistoric Nubia

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A complex polity, archaeologically known as the A-Group, appeared in Nubia at the end of the 4th millennium BCE, contemporary to the rising of the earliest territorial state in Egypt. What characterized the A-Group polity was the control over an interregional trade system and its logistics. Among the items that the A-Group traded with Egypt, there was frankincense, an aromatic resin that originated from the Horn of Africa, the ancient Egyptian's land of Punt. Whilst it is well documented the use of this resin in ancient Egypt, far less known is its use by the A-Group polity.

In elite funerary contexts were discovered many incense burners. They consist of relatively standardized objects, circular bowls made of soft stones, often decorated on the outer walls, with a shallow depression on the upper face used for burning the incense. At the royal cemetery in Qustul, two items displayed a decoration that followed the Egyptian royal iconography. In some instances, the incense burners were outside the grave shaft, hinting at an actual use during rituals for the deceased. Only in a tomb found in Kerma were recovered fragments of the resin. There is further use of incense burners in non-mortuary elite rituality, as attested in the decoration of a seal impression.

Frankincense is a rare occurrence in contemporary elite tombs in Egypt; instead, there is no evidence of standardized containers used for burning incense in Egypt before Dynastic times. The Nubian burners are thus among the oldest known incense burners. The earliest evidence of the kind from the Arabian Peninsula dates only to the end of the 3rd millennium BCE.

Mots-Clés: Nubia, A, Group, frankincense, incense burners, power.

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An Integrated approach to the study of Phytoliths and Thin Sections from Ground Stone Tools at Elephantine, Aswan, Egypt

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The analysis of phytoliths represents an approach not previously used in archaeological work in Egypt. It allows reconstructing vegetation, climate, ecology and nutrition at a site and complements the study of macroscopic plant remains.
The Realities of Life project is conducting research on find material from Middle Kingdom (c. 1800 BC) non-elite dwellings in the island city of Elephantine. For the first time, a combined study of grinding stones using methods of micromorphology, macrobotany, and phytolith analyses is conducted here.
By comparing phytoliths isolated from the pores and surface of the stones with plant particles in micromorphological thin sections, the actual use of the tools can be better understood. Findings on this have so far been based primarily on pictorial representations, which were under the strong influence of the elite classes of the Pharaonic Empire, and on find contexts of the objects. The pilot study presented here aims, among other things, to better understand the techniques of preparation and the plant components of the food of the inhabitants of the buildings studied. Combining the results of the phytolith study with the results of the study of plant macroremains reveals the full spectrum of historically used flora, from wild plants to domesticated species. Thus, the interaction between humans and the environment in the area of the first Nile cataract is further illuminated. From an archaeological point of view, a tool that has been found in big numbers but hardly considered as a research subject so far is comprehensively analyzed in its historical framework of use. Thus, in various respects, hitherto hardly or not at all used paths in archaeological research within Egypt are trodden.

Mots-Clés: Middle Kingdom, Elephantine, Grinding stones, Phytoliths, Micromorpholgy

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One hundred years of landscape archaeology in the Fayum, Egypt

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While the archaeological remains in the Fayum were known to archaeologists since the nineteenth century, archaeological research began in earnest with the work of Gertrude Caton-Thompson and Elinor Gardner in the 1920's. This work is now almost one hundred years old, yet still remains relevant for the interpretation of the Fayum and the early and middle Holocene occupation of the area. The approach they employed was one of the first collaborations between archaeology and geology in Egypt, and the work of Gardner is considered one of the first examples of geoarchaeology and arguably landscape archaeology. Since the early twentieth century further work has been carried out adopting both landscape and site-based approaches. Most recently the URU Fayum Project has adopted a landscape approach to archaeological research in the Fayum and integrated the previous work of Caton-Thompson and Gardner to enhance the understanding of the area. Attention is paid to the formation of the archaeological record and how this influences interpretation of past human behavior. In this paper we discuss the history of landscape archaeology in the Fayum and implications for our understanding of socio-economic change in the Holocene.

Mots-Clés: Landscape archaeology, formation, settlement pattern, Fayum, Egypt

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Revisiting settlement pattern in the Fayum

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The study of settlement pattern in early to middle Holocene Egypt has largely focused on defining functional types of occupation such as camps and villages. The interpretation of these sites is based on a range of archaeological variables including density and extent of archaeological material, the range of material culture categories present, especially their functions. In the Fayum, previous settlement pattern analyses have proceeded in this way, although in our recent work we have applied several alternative measures of settlement mobility to artefact assemblages. In this paper we examine the empirical foundations of previous settlement pattern approaches by investigating these variables as a proxy for settlement pattern. We suggest that a more robust understanding of assemblage formation is required that considers the impact of assemblage size and artefact use-life on diversity.

Mots-Clés: Diversity, Mobility, Settlement pattern, Fayum, Egypt

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Going through the change: The acculturation process of the Eastern Maghreb communities. The case of Kef Hamda, Makhtar, Tunisia

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Kef Hamda is an open-air site located on a terrace along the el Garia crest of the Tunisian Ridge, ca. 20 km south from Makhtar. The site was discovered and firstly investigated in 1973 by Jamel Zoughlami who attributed it to an Upper Capsian horizon. In order to better define its chrono-cultural sequence, the site was reinvestigated in 2014 in the framework of works carried out by the Tunisian-Italian Archaeological Project in Northern Tunisia. Two trenches were excavated revealing a 120 cm stratigraphic sequence, made up of eleven occupational layers, containing remains of different structures and features remains related to possible domestic activities. *Quercus* sp. acorns and *Pinus halepensis* seeds excavated from the deposit were radiocarbon dated from the end of 10th / beginning of the 9th to the first half of the 8th millennia cal. BP. The poorly preserved faunal remains revealed the presence of wild species only; among these, small and medium-size bovids, Alcelaphini, gazelles, and some leporids are present. The presence of eggshell sherds suggested some exploitation of ostriches. Helicidae shells, likely consumed as food, are present throughout the sequence. The systematic analysis of charred seeds and wood charcoal (see the other presentation in this session by Morales et al.) only revealed the presence of wild taxa. The lithic products, primarily manufactured using flint, show a marked unidirectional lamellar production for manufacturing backed bladelets, geometric tools, notches, and denticulates. Pressure technique is definitely present from layer 2 of the sequence. A local variety of limestone was also exploited, mainly through a hard hammer direct percussion technique for the production of more expedient tools on flake. An obsidian flake, possibly from Pantelleria, was also recovered. The last three layers of the sequence, dated to the first half of the 8th millennium BP, also yielded pottery. When preserved, the surfaces are well finished, slipped, smoothed,

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and burnished. Only one sherd, coming from the uppermost layer, was decorated. Seven sherds underwent organic residue analysis, with results from three sherds suggesting the processing of ruminant carcass products in two vessels and mixed ruminant and non-ruminant animal products in the third. Whilst the exploitation of food resources did not highlight any particular trend or change over the sequence, the analysis of the material culture from Kef Hamda revealed a clear acculturation process of the local Upper Capsian communities of hunter-gatherers, who adopted pressure technique for lamellar production from the beginning of the 9th millennium BC, and pottery from the first half of the 8th millennium BP. Far-flung, possible maritime, contacts are also witnessed by the presence of obsidian artefacts from Pantelleria.

Mots-Clés: Epipalaeolithic, Upper Capsian, Acculturation, Hunting gathering economies

New Investigations on Holocene Settlements in the far northeastern Algeria

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So far, the knowledge on the prehistoric settlements in the far northeastern Algeria has been limited to the fieldwork investigations of J. Morel in the fifties. This researcher reported only open-air settlements mostly concentrated in forest clearings or wadi shores and belonging to different prehistoric times. Moreover, the few test pits that he carried out in the region lacked radiometric dating and reliable stratigraphic units which deprive the region from any consistent chronocultural assessment.

The recent fieldwork investigations initiated for the first time by a multidisciplinary research team, as part of a project directed by L. Sari under the aegis of CNRPAH, allowed the discovery of new open-air and sheltered sites in the far northeastern Algeria. Here, we present the results of the multidisciplinary analyses carried out at locus 2, a rockshelter site in Kef Fedda massif in the Bougous valley (El Tarf wilaya). This rockshelter is a small pseudo-karstic solution cavity dug into the sandstone of Kef Fedda massif with easy access to forest food resources and Oued Bougous. The archaeological deposit is stratified into four superimposed stratigraphic units rich in charcoal decreasing from the top to the base of the sequence. Several sediment analyses (granulometry, endoscopy, quantification of the coarse fraction, DRX, XRF and magnetic susceptibility) have made it possible to better understanding the site formation. Organic remains were not preserved, due to the acidity of the sediment. The combination of sediment analyses and archaeological study allowed to better situating the chronocultural assessment of the recovered archaeological remains. The analysis of the artefacts indicated the occurrence of specific lithic components, which show both Iberomaurusian peculiarities and Capsian affinities. The attribution of the artefacts to the Epipaleolithic is enhanced by radiometric dating obtained on charcoal carefully collected during fieldwork. The Epipaleolithic occupations are topped by a funerary structure containing a young adult buried on the belly and very contracted limbs. Lithic artefacts and an ostrich egg-tested threading washer were placed on the corpse and smaller stones loaded the body. The structure is composed of several blocks of stones arranged in staggered so that each block overlaps with the next one by surrounding the corpse. Other stone blocks, more or less bulky, covered the structure. Bone collagen taken from the latter yielded a radiocarbon date from middle Holocene.

These results confer to the site a prominent key role in the understanding of the techno-economic

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behaviors of the Epipaleolithic and Neolithic populations in the region and update the knowledge on the funerary practices of the Neolithic populations in the far northeastern Algeria.

Mots-Clés: Far northeastern Algeria, Kef Fedda, Epipaleolithic, Neolithic, human settlements.

Mangeurs d'escargots terrestres à l'Holocène : les hommes capsiens et néolithiques au Maghreb oriental

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Les *rammadiyat*, sites de plein-air du Maghreb oriental, présentent une grande richesse des espèces malacofaunique terrestres durant l'Holocène (le Capsien et le Néolithique). Cependant, la liste de ces espèces varie d'un site à l'autre. La répartition spatiale des taxons majeurs de mollusque montre la présence de trois zones géographiques différentes : une première zone, la Tunisie Centro-méridionale est dominée surtout par *Sphincterochila candidissima*. La seconde est celle des régions de Kasserine et de Tébessa où les groupes humains collectent principalement trois espèces : *Helix melanostoma*, *Helecilla sp.* et *Sphincterochila candidissima*. Cette dernière espèce perd sa place comme taxon majoritaire dans les sites holocènes de l'Est algérien (le cas de Medjez I) au profit de *Helix melanostoma* et *Xerocrassa latasteopsis*. Quant à *Cornu aspersum*, son territoire est limité au Nord du Maghreb oriental avec une présence restreinte à Medjez I et Kef el Agab. Cependant, elle prédomine à Gueldamen. La collecte des escargots terrestres est guidée par deux facteurs : les données biogéographiques qui favorisent la présence et l'abondance de certains taxons malacofauniques par rapport à d'autres et par préférences gustatives chez ces groupes humains. Du Capsien typique au Néolithique, les consommateurs continuent à ramasser et à manger les mêmes taxons majeurs dans chaque zone.

Mots-Clés: Escargots terrestres, alimentation, répartition spatiale, Tunisie, Algérie, Capsien, Néolithique

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Prehistoric Upper Egyptian social structure in the first half of the 4th Millennium BCE: An investigation to revisit social status seen from mortuary evidence

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This paper aims to reconsider society and the nature of social status in the first half of the Upper Egyptian Naqada Period (Naqada I and IIA-B Periods) in the 4th Millennium BCE which corresponds to the Chalcolithic. The Naqada Period has the crucial historical significance of social development towards the emergence of an early state which appeared in ca. 3050 BCE. Previous research for mortuary evidence reveals the social status of individuals connected to vertical dimensions including the social stratum played an important role in the state formation process, particularly after the Naqada IIC Period in ca. 3450 BCE. However, the society and social status in the Naqada I and IIA-B Periods is open to further comprehension due to relatively scarce archaeological evidence or relative chronological difficulty except for some recent discoveries such as Localities HK6 or HK43 at Hierakonpolis or Cemetery U at Abydos. Given this situation, legacy data can have renewed importance by integrating it to the recent knowledge for further understanding of this time frame. In this paper, I focus on the legacy data from the excavations at large cemeteries such as Naqada where a regional centre during the Naqada I and II Periods lay, together with recent discoveries. The discussion is particularly focused on the graves with a large number of funerary goods or a variety of types and disposal areas, which all these aspects are effective to consider social status. This paper argues that the society of the Naqada I and IIA-B Periods still partially possesses kin or lineage basis inherited from the Neolithic. I consider that the mortuary evidence of this timeframe can offer various commingled aspects of social status not only the initial hierarchical but also the non-hierarchical nature. In other words, mortuary archaeological evidence of the Naqada Period does not always reflect vertical social status difference and it may also embrace societal roles which are not directly relevant to hierarchy. I suppose that such multi-aspects of social status were gradually replaced into the hierarchy-oriented frame in several large communities of regional centres. The process towards the state formation was still not straightforward in the early 4th Millennium BCE, and aspects of social status seen from archaeological evidence from this timeframe were not necessarily connected to the later early state.

Mots-Clés: Upper Egypt, Naqada Period, Mortuary Evidence, Social Status

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Early and Late Neolithic Pottery of Ifri n'Etsedda, Eastern Rif, Morocco.

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Since 1995 archaeological research has been carried out in the Eastern Rif by a Moroccan-German research team with a participation of the Institut Natiotal des Sciences de l'Archéologie et du Patrimoine du Maroc, the Deutsches Archäologisches Instituts, the Autonoma University, Barcelona and the University of Cologne. During that time several hundred sites from the Lower Paleolithic up to Islamic times were discovered, of which several were excavated.
A major topic of the project is the transition to food production and related developments. Altogether 18 epipalaeolithic and neolithic sites were excavated. Neolithic innovations such as pottery and domestic species begin around 7.6 ka calBP. Plant cultivation for cereals and pulses is clearly documented for this time period; representing the earliest evidence of plant cultivation for the entire African continent. Two important sites within the study area are the shelters Ifri Oudadane and Ifri n'Etsedda. Both provide epipalaeolithic as well as neolithic deposits. While lithic artefacts may bear witness to already existing technological and behavioral traditions, innovative technologies such as pottery production or cultivation attest new external influences. Whereas the pottery from Ifri Oudadane has already been presented, the publication of the pottery from Ifri n'Etsedda remained a desideratum. This paper now presents the pottery assemblage of the later. The Early Neolithic deposits date 7.2 and 6.1 ka calBP, overlain by a Late Neolithic layer. The settlement focus is the late Early Neolithic C between 6.6 and 6.1 ka calBP. While the Pottery at the Beginning of the early Neolithic is mostly decorated with Cardium impressions using rocker stamp technique, the later material provides a so-called "Herring-bone" motif using a non denticulated shells or combs.

Mots-Clés: Maghreb, Pottery, Neolithic Transition, Morocco

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Augmenting current paradigms: Nilotic rock art reconsidered

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The Aswan-Kom Ombo Archaeological Project recently discovered an impressive concentration of petroglyphs in a previously unexplored wadi in the desert east of Aswan (south Egypt). A unique panel shows figures and quadrupeds painted in different shades of red and a few instances in white, which according to current understanding, belong to a 'cattle tradition' generally attributed to the Middle Nubian period (c. 2500-1500 BC). However, carved over the paintings are several engraved images, for which the best parallels are known from the Egyptian Eastern Desert and usually attributed to the Naqada period (c. 3800-3300 BC).
This quite problematic panel raises the questions of the 'who' and the 'when'. Although a classic set of inquiries in rock art studies, these questions have never been properly addressed regarding Egypto-Nubian rock art. Current scholarship rarely considers the large chronological and cultural spectrum of Nilotic rock art, and published analyses tend to bind these productions to the dominant cultural assemblage attested either in Egypt or in Nubia. Because of this approach, only panels with motifs that reproduce images and themes found on Egyptian Predynastic/Early Dynastic (c. 4500-2600 BC) material culture, and to a lesser extent on the material culture of the Middle Nubian phase, have been thoroughly considered. Part of the available data then remains unaddressed.
However, for millennia the deserts surrounding the Nile Valley were crossed by highly mobile groups. It appears that at least some specific depictions found in desert contexts, usually attributed to the Naqada period, may very well be the expression of those mobile people and could even be later in date than the various dating criteria from the Nile Valley might suggest. This paper aims to augment current paradigms in the study of figurative rock art in Egyptology and Nubiology and to provide new avenues for investigations.

Mots-Clés: Nilotic rock art, Aswan, Egypt, paradigms, multiple traditions

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Interregional contacts in late prehistoric Egypt: study of 'fibrous ware' and related decorated pottery in the Upper Egyptian Nile Valley

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The aim of the proposed paper is to contribute to the reconstruction of socio-economic and cultural dynamics of complex societies of Egypt in the 4th millennium BC, by offering a comprehensive examination of a specific ceramic production and critical review of interregional connections that it may reflect.
The object of investigation is the so-called 'fibrous ware' pottery, made of a fine clay, likely of alluvial origin, with distinctive thin organic, sometimes wavy, temper and occasionally featuring-equally distinctive-impressed or incised decorative bands. This type of pottery has been documented more frequently in Lower Egypt, where it has been considered to be typical for the Buto-Maadi (or Lower Egyptian) ceramic tradition. However, given its presence also in Upper Egyptian ceramic assemblages, the question of whether it represents a "*Lower Egyptian cultural trait*" or rather it is part of a wider "'*Egyptian' cultural system in the Nile Valley and Delta*" has been debated. Recent in-depth analysis of fibrous ware samples from a number of Lower Egyptian sites has greatly improved our knowledge of this pottery, especially of its techno-morphological features, although could not clarify its place of production nor its origin. Fibrous ware pottery has occasionally been reported from sites in Upper Egypt, where it is generally regarded as an import from the north, however the full-albeit limited-records of these ceramics from the southern part of Egypt have yet to be scrutinised comprehensively and their wider significance evaluated.
In order to fill this lacuna, a new study of the corpus of pottery made of fibrous ware and vessels decorated with incised/impressed designs related to this distinctive ceramic production, and thus far known from the Upper Egyptian Nile Valley, has recently been conducted. Preliminary results from technological, typological, quantitative and distributive analyses, that have involved both direct re-examination of unpublished ceramic materials and re-assessment of published ceramic data, will be presented in this paper, along with their potential contribution to a better understanding of Upper-Lower Egypt interactions in the Egyptian Late Prehistory.

Mots-Clés: Egypt, Late Prehistory, Predynastic, ceramic analysis, fibrous ware

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L'abri du Dyr : un nouveau site capsien de la région de Tébessa (Algérie orientale).

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L'abri du Dyr est un site nouvellement découvert dans la région de Tébessa (2015) aux confins algéro-tunisiens. C'est un abri sous roche d'assez grande superficie localisé dans la partie sud du synclinal du Dyr au nord des monts de Tébessa. Un sondage, effectué en 2017 sans atteindre le substrat rocheux, y a révélé une succession de six unités stratigraphiques. Celles-ci ont livré de nombreux éléments archéologiques (industrie lithique, osseuse, restes fauniques...) qui suggèrent plusieurs occupations attribuables au Capsien. On note la présence de restes d'ongulés de grande taille comme l'auroch et de taille moyenne telle que l'antilope bubale. La présence de restes de gazelles est également à signaler. L'industrie, quant à elle, a été taillée essentiellement sur des matières locales et se caractérise par un taux de transformation très bas. On observe un relatif équilibre entre les différents groupes d'outils.
Les premières datations sur charbons réalisées dans les unités stratigraphiques 2 et 5 situent l'occupation de l'abri au 9e millénaire BP. Ces dates donnent une certaine importance à l'une des particularités du site, à savoir la découverte de structures anthropiques, dont des murets et un foyer à l'architecture assez complexe par rapport à celle jusqu'ici décrite pour cette période chrono-culturelle.

Mots-Clés: Algérie orientale, holocène, épipaléolithique, Capsien, structures anthropiques

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The high Tafna (Tlemcen Mountains, extreme northwestern Algeria), an underexplored prehistoric hinterland :Preliminary resultsof the 2021 sesaon survey.

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As part of a research project initiated by the CNRPAH (Centre national de recherches préhistoriques, anthropologiques et historiques) which aims to improve our understanding of the prehistoric human settlement in the Tafna basin (*western Orania*), a territory hydrographically and topographically divided into three areas, the low, the middle and the high Tafna; a specific survey mission was conducted in march-april 2021 in the latter and mountaneous territory (800-1400 m) which has so far delivred no evidence of an important prehistoric settlement (until a short survey in 2016) compared to the other two ones. The primary objective was to know whether this research gap is due to the fact that this area is really devoid of human repeated occupation or to the lack of explorations. Preliminary results seems to confirm the second hypothesis as several find spots with lithic artefacts dating in apperance from the final paleolithic to the neolithic were found in a geographic domaine almost completely dominated by karst phenomena (caves and rocksheltters).

Mots-Clés: Water, Karst, Cave, Shelter, Lithic Artifact, Raw material, Occupation

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Ethnoarchaeological adaptation models of Saharan pastoralism to Holocene climatic catastrophes

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Climate changes and consequent catastrophes occurred during Holocene in the central Sahara. Saharan human responses mainly depend on water accessibility. Rainfall affects this availability. Central Sahara is a significant context for studying adaptation patterns to ecological conditions and Tuaregs are contemporary witnesses of climate disasters. Their adaptive reactions to catastrophes outline a behavioural framework for past climate crises as well as archaeological sites are privileged archives of dialectical interaction between groups and landscape. Ethnoarchaeological models permit reconstructing human responses to rain phenomenon during catastrophic climate processes. A comparison between the rainfall proxy, Ethnohistory, and Tuareg historical memory allows identifying three catastrophic moments related to water accessibility: Dry Event, Dry Phase, and Dry Period. Holocene climatic catastrophes and Saharan ecology are suitable for investigating adaptations or collapses and Three Dry Moments general model could help to understand Saharan Pastoralism responses to climate changes.

Mots-Clés: Tuareg, Climate change, Drought, Holocene, Sahara, Water, Catastrophe, Rainfall, Ethnoarchaeology.

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Last foraging activities vs productive economics: A gradual transitional system of food production from Neolithic sites in Tunisia.

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Since the second half of the 8th millennium cal BP, humans groups from Neolithic sites in Tunisia changed gradually their economic strategies. We note from different stratigraphic sequences progressive shifts from mostly foraging activities (Early Neolithic groups) to mainly breeding system. Hunting activities are still mainly practiced as shown from the beginning of the archaeological sequences, and they are associated with few caprine (sheep and goats) breeding; later on, during the (Late/Final Neolithic), breeding activities of caprines, cattle, and dogs increase, while some occasional hunting activities are still practiced. Some complementary resources shared with their predecessor Capsian groups still remains, such as gathering and consuming land snails and wild plants. Some technological innovations, such as pottery, lithic and bone tool manufacturing, already set up by Capsian groups such as pottery, increase during the Neolithic groups. This paper will discuss all the transitional features detected at some Neolithic sites from Tunisia.

Mots-Clés: foraging activities, food production, Neolithic, Capsian, Tunisia.

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Records of AHP in the Northern Farafra depression inferred from geoarchaeological and sedimentological study

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During the Early and Mid-Holocene, the now hyperarid Wadi el-Obeiyid in the Northern Farafra depression experienced phases of favorable climate with rainfall that resulted in the formation of playa lakes and abundant grass vegetation. Starting from the earliest phases of the Holocene, the region was reoccupied by human groups after the abandonment during the Late Pleistocene. This paper presents the results of the geoarchaeological survey integrated by geomorphological and sedimentological investigations carried out along the Wadi el-Obeiyid, with particular regard to the Sheikh el-Obeiyid and Quss Abu Said areas. Three phases of playa corresponding to three occupation phases intermingled with two deflation scree layers, corresponding to wet and dry climatic conditions, were recorded in these areas. Playa PI is recorded at the wadi floor starting from ca. 11,000 cal. BP and it ends with Scree 1, possibly corresponding with the 8.2 ka BP arid event. The new humid phase, corresponding to Playa PII, starts at Sheikh/Bir el-Obeiyid from ca. 8000 cal. BP and shows the presence of slab structure sites and lithic production belonging to the so-called bifacial tradition. Both sedimentological and palaeobotanical features indicate that during this period the Wadi el-Obeiyid benefitted from winter Mediterranean rainfall. A short dry episode (Scree 2, ca. 7100 cal. BP) falls between Playa PII and Playa PIII which is dated from ca. 6400 to 6100 cal. BP. This points to a final Mid Holocene exploitation phase of the area, probably by small groups of herders who periodically visited the region when the climate was already starting to deteriorate. The sedimentological characteristic of Sheikh/Bir el-Obeiyid playa sediments record several cyclic depositional episodes, each composed of (1) initial high-stand, followed by (2) a long episode of ephemeral lake sediment accumulation, and finally (3) lake shrinkage and prolonged exposure and sand dune accumulation. During the late Holocene, the climate was generally arid and groundwater-supported lakes replaced the rain-fed playas of the early-mid Holocene. After 4500 cal. BP, the playa basins became dry when the lake dried up and humans abandoned the area. The observations reported here, compared with the paleoenvironmental sequence already established for other areas along the Wadi el-Obeiyid (El Bahr, Hidden Valley), and the 14C dates available, will allow a more precise correlation between environmental and population changes.

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Mots-Clés: Farafra, Egypt, Holocene, AHP, Geoarchaeology

First evidence of an Associated-Bone-Group in Northwestern Africa: The deposit of a domestic sheep skeleton from the Neolithic phase of Medjez II site (Algeria)

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The lasted excavation campaigns at Medjez II yielded new important data about the prehistoric context of this well-known "*escargotière*". A nearly complete domestic sheep (*Ovis aries*) skeleton in perfect anatomical connection was an exceptional discoveryrecently made at the site. Archeozoological study determined that it aged less than 16 months, and the analysis of bone surfaces has detected no trace of any treatment of the carcass. The osteoarcheological analysis of the carcass, performed during the excavation, has demonstrated the presence of several procedures which have been applied around of the carcass: digging and preparation of a pit, paw binding, carcass wrap, many lithic objects and ocher were deposited, and finally the body was loaded with stones. The articulated state of the skeleton and the absence of any economic or subsistence treatment or evident injuries, make it the first case of an Associated/Articulated Bone Group (ABG) reported in Northwestern Africa for the prehistoric period. The study of the archaeological context of this deposit combined to its absolute dating (5651 – 5580 cal BP) revealed that this ABG belongs to the Neolithic period. Despite the presence of "funerary-type" characteristics common to conventional burials from this period and guided by the domestic and consumed nature of this animal, we favour the hypothesis of the deposit as an offering, probably linked to the practice of agriculture.

Mots-Clés: Neolithic, Associated, Bone, Group, Domestic sheep (Ovis aries), Northwestern Africa, Algeria, Medjez II.

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The Nubian rock art: History of the research

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The research on the Nubian rock art, in the framework of the more general archaeological research, began between the second half of the XIX century and the XX century. The rich repertoire of sites is known through a series of publications in different languages and studied applying various kinds of approaches.
The present communication will deal with:

1- The history of the research;

2- The approaches adopted in the study of the different contexts;

3- The debate about the chronological issues;

4- A synthesis of the Nubian rock art's general features, with a particular attention to the execution techniques and styles;

5- The kind of interpretations proposed for the regional rock art contexts.

Mots-Clés: Nubia, Rock Art, History of the research, Chronology, Interpretations.

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S21-A: Climatic changes and human occupation of mountain environments in prehistoric and protohistoric times

Habitat and ecology of red deer and horse from the high-altitude site of Montlléo (Catalonia, Spain) during the Magdalenian

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Montlléo is an open-air site located in the Cerdanya valley in the Pyrenees close to the river Segre and at 1134 m above sea level. Excavated since 2000 by the SERP team of the University of Barcelona, the site revealed an early Magdalenian occupation dated between 16,900 and 15,400 years BP (ca. 20,400-18,700 cal BP) coeval to the GS-2a phase, as well as a previous phase in the Final Solutrean around 18,800 years BP (ca. 22,800 cal BP; Mangado et al., 2019). The archeological investigation exposed a large range of lithic artefacts made of raw material of different origins, north and south of the mountains (Sánchez de la Torre et al., 2019), and introduced in the site as bulk or pre-formed shape (Fullola et al., 2012). Perforated molluscs of both Mediterranean and Atlantic origins confirm the strategic position of the site on a north-south and west-east raw material transit (Mangado et al., 2014). Faunal remains are dominated by horse (*Equus* sp.), red deer (*Cervus elaphus*) and small bovids (*Rupicapra rupicapra* and *Capra pyrenaica*), while rabbit is also represented (Mangado et al., 2015). Horse and red deer were likely the main source of meat for the early Magdalenian hunter-gatherers of Montlléo who may have exploited the position of the site to exploit both lower and upper parts of the Segre valley (Mas et al., 2018).

In this communication, we aim at reconstructing the diet and habitat of horse and red deer found from the Magdalenian occupation at Montlléo through isotopic investigation. We have conducted intra-individual sampling of enamel along molar teeth and measure the relative abundance of 13C and 18O in carbonate. The results should provide information on seasonal variation in diet and environment experienced by both species. In parallel, bones of horse and red deer were selected to extract collagen and perform 13C and 15N analysis. Bone collagen remodels over the life of the specimens and provides thus long-term information on diet and habitat of the animals. We

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will examine the possible niche partitioning between horse and red deer and potential differences in their habitat which will give insights into the hunting strategy of the Magdalenian human groups in mountainous areas.

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Mots-Clés: Habitat, ecology, red deer, horse, high, altitude site, Montlléo, Catalonia, Spain, the Magdalenian

Another tile in the reconstruction of Mesolithic human occupation in the southern Alps: evidence from Comèlico, upper Piave river system (NE Italy)

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Highland seasonal occupation in the Alps during the Early-to-Middle Holocene is well documented by a rich evidence, although mostly represented by lithic scatters. Human exploration of this mountain range started during the Late Glacial period and developed importantly during the Early Holocene, boosted by the increase of temperatures and favorable climatic and environmental conditions. Probably, it was also enhanced by the general demographic growth and the need to widen the spectrum of resources seasonally available to human groups. The south-central and eastern Alps represent so far, the region with the most dense number of sites. Nonetheless, such evidence is rather inhomogeneous and while some areas appear densely and intensively exploited other are either avoid of evidence or characterized by a less consistent record. Whether this situation mirrors the real occupation of the region by Mesolithic groups or represents a research bias related to the differential preservation of the record and/or the intensity of the investigations remains open for debate. In this paper we would like to discuss this issue by presenting the evidence of the Comèlico area, in the upper Piave valley, located at the present political border between Italy and Austria. Survey investigations carried out between the 1990'ies and 2000's allowed to identify an interesting group of lithic scatters, so far unpublished, at altitudes between 1295 and 2475 m a.s.l. within a territory which was previously completely avoid of any evidence of prehistoric occupation. The methodology applied involved a techno-economic study of the lithic assemblages coupled to a spatial analysis at a territorial scale. Such methodology was aimed at investigating the chronologies of occupations, the settlement choices, and the provenance and itineraries covered by prehistoric human groups.

Mots-Clés: Reconstruction of Mesolithic, human occupation, southern Alps, Comèlico, upper Piave

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river system, Italy

Late Magdalenian occupations in alpine type mountains of Central Europe – a case study of Hučiva Cave in Tatra Mountains (north Slovakia)

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In the light of newest discoveries, it can be said, that Late Magdalenian settlement in highland areas of Central Europe is represented by a horizon with shouldered points (dated to Bølling and Alleröd). Archaeological site of Hučiva Cave was discovered and excavated in recent years in the region of the Tatra Mountains. The settlement model included most probably a short term stay. The relation of the settlement dynamics with the climatic changes in the region is probably strong – in Tatras, like in most alpine type mountains in this time period the glaciers were covering most of the terrain. Yet it has to be underlined, that the glacier never existed in the direct proximity of the site – the distance was never less than that of 1 km. It seems, that peoples of this time period operated in unusual environmental circumstances. Those processes probably are connected with a very specific faunal remains on the site (visible preference of *Capra ibex* in Huciva Cave). The taphonomic study for the evidence of human modification of bones are of a preliminary nature. In the discussed case we should consider a very specific use of the mountainous regions by Magdalenian people, including hunting, raw material procurement and mobility strategies.

Mots-Clés: Magdalenia, mountainous settlement, Tatra Mountains, Bølling, glaciation

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Apennine passages of the Early Neolithic in Northern Tuscany (Italy): sites, productions, resources

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The early Neolithization of northern Tuscany by groups connected to linear ceramics affected the Apennine arc that divides Tuscany from the Po area. The problem presented here broadens the perception of mountain areas as a territorial objective essentially linked to the progressive ascent of the ridges in the deglaciation phases, by the last hunter-gatherers. The evidence known to date, although numerically limited, indicates that the Apennine areas have been places of transit since the end of the seventh millennium bp (chronology not calibrated), perhaps aimed at the search for raw materials, where agriculture is practiced and a practice of differentiated plant uses. The two still unpublished sites of the Florentine territory of Cialdino (Mugello mountain area to the east) and Cantagrilli (ridges between Prato and Florence) are described in their main aspects. The reference to what has already been published for the contemporary sites of the westernmost ridges (Piano di Cerreto and Muraccio) allows us to set a problem on the links between these Tuscan groups with other neighboring Ligurians and Po Valley, on the role of the Fiorano culture in the Neolithization process in area under examination, on the hypothetical causes of mobility and on the methods of insertion in the examined habitats.

Mots-Clés: Apennine passages of the Early Neolithic, Northern Tuscany, Italy

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Monte Cetona (Siena, Tuscany): visual marker, nodal settlement point and cultural indicator in interregional relations between the Neolithic and the Bronze Age.

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The Apennine ridge of southern Tuscany finds in the Monte Cetona a singular relief that from a height of 1140 m asl overlooks the humid flatland area of the Val di Chiana and nearby rolling foothills. During Prehistory, Monte Cetona was a point of reference in the course of the Holocene (Pleistocene evidences exclusively attributable to the presence of Neanderthal groups are rare) since the Neolithic but above all in the Metal Ages, particularly during the Bronze Age period. A visual marker set in a water-rich landscape, Monte Cetona was capable of taking on the role of settlement attraction pole, a result that derived not only from its geographical location but also from the presence of numerous caverns. On its slopes and summit, in fact, various settlements and forms of ritual evidence have been recorded. The Authors of this contribution will present an overview of our current knowledge of the different environmental and economic assets, production activities and forms of local resource exploitation, showing how this mountain can be considered a nodal point for both mobility and communication routes in the wider territory of Central Tyrrhenian Italy.

Mots-Clés: Monte Cetona, Siena, Tuscany, visual marker, nodal settlement point, cultural indicator, Neolithic, Bronze Age.

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Human frequentation and abrupt climate changes in southern Apennines (Italy) between Late Pleistocene and Early Holocene. New data on faunal remains and lithic resources exploitation at Grotta del Romito (Papasidero, Cosenza)

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The passage between the Late Pleistocene and the Early Holocene is considered a moment of abrupt climate changes that marked the end of Late Glacial and the beginning of the current Interglacial. These fluctuations drove large and small mammals to adapt to the new environments forcing cold-climate species moving northward or searching ecological niches suitable for them. The southwestern Italian peninsula can be considered a key area to study mammal adaptation to the environment changes happened during this period and to investigate the subsequent changes in both settlement strategies and resources exploitation by Paleo-Mesolithic hunter-gatherers. In this area, one of the most important sequences that allow to study the passage between Late Pleistocene and Early Holocene is Grotta del Romito (Northern Calabria, 275 m a.s.l.) in the southern area of the Pollino massif. The recent archaeological investigations carried on this site had detected a very detailed chrono-cultural sequence spanning from Late Epigravettan to Sauveterrian (ca. 15-11.000 cal. BP).
Changes in large and small mammal communities at Grotta del Romito reflect transformations happened in the whole region during the end of the Late Glacial: the afforestation and the consequent disappearance of open habitats. In southwestern Italian peninsula, the abrupt warming oscillation of the Bølling-Allerød Interstadial and the subsequent climate variability have been also detected in other sequences. This moment is characterized by the rapid increase of forest areas and the decrease of open and dry meadows.

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The study of large and small mammal remains from Grotta del Romito allowed us to reconstruct the local and regional climate and environment. Information about variation in faunal association combined with data on stone tool assemblages, particularly as regards raw materials procurement, are useful to understand changes in human-environment relationship in Southern Apennines from Late Epigravettian to Sauveterrian.

Mots-Clés: Human, environmental interactions, Climate change, Southern Italy, Late Palaeolithic, Early Mesolithic

TesTerra: mineralization and prehistoric peopling in Friulian mountains (Eastern Alps - Italy) between the middle of the 5th and the 3rd millennium B.C.

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The metalliferous deposits of the region are very diverse in terms of geological genesis and mineral species present. They are largely constituted by copper minerals (malachite, azurite), lead and zinc (blende and galena), fluorite and, to a lesser extent, iron minerals; their exploitation has already been confirmed for the Middle Ages and probably already in the Roman age and in prehistoric times. The only site of great extension and intense exploitation is the lead-zinc site of Raibl (Cave del Predil, Tarvisio).
As part of the Interreg V-A Italy-Austria 2014-2020 project TesTerra, research on metallurgical activities is rediscovering ancient shafts and tunnels, identifying materials from prehistoric sites that are remnants of metallurgical activity, such as spoon crucibles, nozzles, and smelting forms, mapping the oldest metal artifacts, and analyzing samples extracted from the deposits and metal objects.

The westernmost area of the territory has given back a copper awl dated, according to the structure of origin, to the middle of the V millennium B.C. and at the moment there are about twenty artefacts, including axes and daggers, variously distributed at geographical level and datable to the III millennium B.C. The antiquity of the the awl opens wide and important perspectives on the diffusion of metallurgy through the Eastern Alps and directs the research towards the identification of the origin of the raw material used and the recognition of the paths of diffusion of the knowledge of metallurgic practices and raw materials.

In order to answer the questions that arise from this research perspective, outcrops and evidence of metallurgic activities in the mountain territory, mostly referable to the provinces of Udine and Pordenone, that may have been potentially exploited during prehistoric phases, have been georeferenced. The research analyzes both historical data and those coming from the TesTerra project in order to weave a web of relationships with the distribution of the artefacts. Relationships and spatial data are managed within the GIS to read in an integrated way the information, however partial, related to the development of metallurgy. During pre and protohistory the mountain territories become areas of attraction with respect to natural resource exploitation, mobility, and

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connections within the Eastern Alps region.

In this research framework, a first mapping of the known evidences related to the mountain environment becomes functional to investigate the territorial relationship between outcrops and evidences of metallurgical activities.

Mots-Clés: TesTerra, mineralization, prehistoric peopling, Friulian mountains, Eastern Alps, Italy, middle of the 5th and the 3rd millennium B.C.

S21-B: Mountain Africa: prehistoric peoples and palaeoenvironments

Sacred mountains in the Upper Paleolithic

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Animistic and shamanistic peoples worldwide have traditions of regarding high mountains as being spiritual and the observances of them in songs and myths are widely recorded in the anthropological record. We find these traditions carried directly and metaphorically into ancient religions and literature. High mountains may have also been considered sacred in prehistory given their global spiritual observances to the present time. Early recordings of these sacred high mountain observances may be found in the Upper Paleolithic Cave of El Castillo in Cantabria, Spain and in Gorham's Cave, Gibraltar. Panels in these caves store human fabricated images that closely resemble geological features on two high mountains in the greater Iberian region.

Mots-Clés: Upper Paleolithic, Cave Art, Shamanism, Animism

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The palaeoenvironment in the Ethiopian highland at _~1.6 Ma ago: evidence from stable isotope analysis at Garba IVD and Gombore IB (Melka Kunture, Upper Awash, Ethiopia)

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Garba IV level D (Garba IVD) and Gombore I level B (Gombore IB) are archaeological levels which are part of the Melka Kunture (MK) cluster of prehistoric sites, located on the western edge of the Main Ethiopian Rift at _~2000 m a.s.l. Both have been dated at _~1.6 Ma and record a high-density distribution of lithic artifacts, pebbles, and faunal remains. At Gombore IB the left distal humerus of a *Homo erectus* was also discovered. Additionally, palynological studies document a landscape dominated by extended grassland at Garba IVD, while the mountain forest species were more abundant at Gombore IB.
Here, we present the measurements of 13C/12C and 18O/16O isotopic ratios of dental enamel carbonates on fossil teeth from the two archaeological layers. The analyzed *taxa* included hippopotamids, bovids, equids, suids, and crocodiles (collectively, 42 samples). Fossil teeth were sampled using bulk and intra-tooth serial techniques, then pretreated and analyzed following the internal lab protocol of the working group Biogeology (University of Tübingen, Germany) for the isotopic analyses of carbonates from tooth enamel. Isotopic results on bulk samples indicate that all the analyzed herbivores were mainly grazers, consuming C4 grass. Bulk and intra-tooth carbon isotopic ratios of crocodiles are the most depleted among the specimens. In this case, carbon-13 values suggest that Pleistocene crocodiles ate fishes and/or herbivores, and it may also reflect variations within the diets of herbivores that consumed C3 plants.

Our results seem to be in contrast with pollen data from Gombore IB, since isotopic evidence points to open spaces in the vegetation as C4 high-elevation grasslands. Nevertheless, the stable isotope results from mammal teeth reflect not only the strictly local vegetation available of the time, but also the feeding strategies and ecological behavior of each specimen, including feeding at a distance for the fossil site. Therefore, pollen and isotopic data provide complementary information about the Afromontane vegetation context present of MK since _~1.6 Ma: the landscape was marked by forests and bushy woodland as in Gombore IB with scattered open spaces probably

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near the river, while in other localities as Garba IVD the mountain grassland was more extensive.

Mots-Clés: palaeoenvironment, Ethiopian highland, at _˜1.6 Ma ago, stable isotope analysis

Mid-Holocene adaptation to the highlands of Ethiopia: the case of Beefa Cave, Melka Kunture, Upper Awash, Ethiopia

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During the African Humid Period (15-5 ka BP) the Ethiopian highland was integral part of a wider settlement system, whilst, during the driest phases it could have been a *refugium* area (Hensel et al., 2021). In this framework, vegetable resources played a key-role in the diet, and especially tubers, which are rich of starches and fibers.
Beefa Cave is part of Melka Kunture archaeological site, with a well-known Lower and Middle Pleistocene record. It opens on the right bank of the upper Awash river, at 2000 m a.s.l. on the Ethiopian highland. The first fieldwork, carried on in November 2019, exposed levels of overlapping fireplaces, containing a very standardized lithic complex, composed by obsidian bladelets and geometric artefacts and a significant amount of charred seeds.

Dates obtained from charcoals placed the excavated levels in the Middle Holocene, i.e. a prehistoric phase poorly documented in the Awash basin, at the limit between the Later Stone Age and the Pastoral Neolithic. The residues analysis on a selection of lithic artefacts led to the discovery of several starch granules generally ascribable to wild tubers species and may have played a specific role in the subsistence strategy of the human groups who inhabited the area. Through the analysis of use-wear and residues from the lithic complex, macrobotanical and faunal remains, we reconstruct the specific highland adaptation of the Holocene hunter-gatherers of the Middle Awash.

Mots-Clés: Mid, Holocene, Beefa Cave, Melka Kunture, Upper Awash, Ethiopia

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Plant wax biomarkers reveal climatic and ecological context of high-altitude adaptations across the MSA-to-LSA transition in Lesotho, southern Africa

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Archaeological and paleoecological studies seeking to determine human adaptations to high-altitude environments through the Late Quaternary often face a lack of proxy evidence obtained from archaeological sites. Plant wax biomarkers are an innovative proxy for reconstructing vegetation composition and structure, rainfall intensity, temperature, and other climatic and environmental dynamics directly associated with records of past human behaviour. Normal (n-) alkanes for example, serve as proxy measures for the continental vegetation that synthesized them, while the isotopic signature of environmental carbon (δ13C) and hydrogen (δD) incorporated during plant biosynthesis represent changes in water availability, vegetation communities, precipitation or aridity, evapotranspiration of leaf and soil moisture, and the relative abundance of C3 and C4 plants in response to climate changes. Compound specific measurements on n-alkanes also have the potential to circumvent the ambiguity inherent in bulk sediment isotope analysis.
The Ha Makotoko archaeological site of the Caledon River Valley, located at 1600 m a.s.l., in western Lesotho, offers an opportunity to investigate ecological change and high-altitude human adaptations, and the impact temperature shifts would have had on floral and faunal resources used by humans from the Late Pleistocene into the Holocene, from 56,000 years ago to present. In Lesotho, a well-defined altitudinal distribution of C3 and C4 plant taxa, and their plant wax biomarkers in archaeological sediments, provide a means of estimating past temperature shifts and the ensuing ecological reorganization: i.e., the dominance of C3 or C4 plants at specific

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altitudes. Here, we present a high-resolution isotopic analysis of molecular δ13C and δD of n-alkanes from the site's sedimentary sequence to reveal ecological changes that coincided with the transition from the MSA (Post-Howiesons Poort) to the LSA (Oakhurst). Our isotope data show environmental fluctuations throughout the sequence, likely attributed to temperature changes and water availability, and the human response to these changes at high-altitude.

Mots-Clés: Plant wax biomarkers, reveal climatic, ecological context, high, altitude, adaptations, MSA, to, LSA transition, Lesotho, southern Africa

Pastoral nomads between desert and high mountains: ethnoarchaeological research on the Ait Atta in Morocco

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Over the millennia, different forms of mobile livestock breeding have developed in many mountainous regions of the world. One of the best-known forms of this is nomadism. The main characteristic of this way of farming is non-sedentariness: their families and property strapped onto pack animals, the herds' owners move with their livestock, following mostly fixed routes from pasture to pasture governed by seasonal changes in the climate and vegetation. Mobility patterns arise from the nomads' detailed knowledge of the physical and cultural features of the landscape and the needs of their animals. Over the course of the 20th and 21st centuries, many nomads have transitioned to a semi or post-nomadic form of pastoralism where only a small section of the community follows the seasonal movements of the herds, whilst the larger part of the community remains sedentary and carries out other tasks and jobs in permanent settlements. This transformation has had far-reaching consequences with regard to traditional land use, the economy, vegetation, mobility and interactions. It has also resulted in a dramatic loss of knowledge gathered over the centuries, very little of which has ever been recorded in writing. This was the starting point for the "Arhal" project, which aims to study one of the last nomadic families from the Ait Atta tribe in Morocco to held on to their "traditional" lifestyle. Originating from various ethnic groups in the northern Sahara Desert, the Ait Atta are known to have lived in the Jebel Saghro mountain range since the 15th and 16th centuries. From there, they spread far north into various oases, eventually inhabiting large territories. Since 2017, an international team has been documenting the lives of a contemporary family of nomads moving between their winter and spring camps in the pre-Saharan Jebel Saghro and the rich mountainous pastures in the central High Atlas to the north. The paper will offer an insight into the project's concept and will also outline preliminary results of the investigations carried out in recent years, primarily from an (ethno-)archaeological/anthropological perspective: nomadic mobility patterns, material culture and structures of the mountain nomads as well as their archaeological (in-)visibility, economic practices and organisation, networks, exchange systems and markets. The area exploited by the Ait Atta nomads between the two mountain ranges not only forms a "natural" basis for grazing and subsistence, it also contains different elements of a "sacred" or ritual cultural landscape with cemeteries, sacrificial sites/sacred mountains and rock art sites.

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Mots-Clés: Pastoral nomads, desert, high mountains, ethnoarchaeological research, Ait Atta, Morocco

Shrouded in 'freezingly cold mist': multi-domain human responses to Last Glacial Maximum cooling in highland Lesotho, southern Africa

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With the bulk of its landmass situated between the tropics of Capricorn and Cancer, there are few places in Africa with low ambient temperatures. But the continent's archipelago of high mountain systems and volcanoes are obvious exceptions. As humans began exploiting afromontane and afroalpine environments on more than a sporadic basis, they were obliged to make strategic choices not often faced by foragers in other African ecosystems. This would have been especially true at the outset of glacial and stadial phases, when mean annual temperatures in mountain zones dropped, primary productivity plummeted, and vegetation belts descended in altitude. In southern Africa's highest mountain system – the Maloti-Drakensberg Mountains – the Last Glacial Maximum (LGM) is one of the only times of the past _~100,000 years that saw region mostly or wholly abandoned. Ahead of this apparent population crash, we see pronounced changes across a range of technological, subsistence, and social networking indicators that speak to afromontane foragers trying to come grips with their predicament, often in innovative ways. Here, we present zooarchaeological, lithic and social technological, and multi-proxy palaeoenvironmental data spanning the LGM from Melikane and Sehonghong, two key Late Pleistocene sequences in the mountain core of highland Lesotho. Our integrated datasets speak to intensification behaviors across a range of cultural domains, coupled with territorial and social network reorganizations, before such adaptive responses ultimately failed afromontane foragers altogether. We close by speculating on possible knock-on implications for attendant impacts to local hunter-gatherer belief systems.

Mots-Clés: 'freezingly cold mist', Last Glacial Maximum cooling, highland Lesotho, southern Africa

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S24-B: Composantes, chronologies et formes de l'industrie osseuse en Afrique

Ostrich eggshell and its utilization in African prehistory

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Among the hard materials of animal origin, the ostrich eggshell is still today assimilated to a particular mode of subsistence and/or mobility in Africa so that it appears emblematic of this continent due to its trans-regional and trans-chronological scope. Because of its shape, this material looks very useful in its natural state. However, engraved or even reduced to fragments regularized into many grains, the ostrich eggshell also reveals different conceptions in its use. We will explore the meaning to be given to the different chains of transformation collected from the analysis of published data recorded in descriptive ethnographic works and excavated archaeological sites, including some aspects of partly published pieces from Jacques Tixier's excavations in Bordj Mellala (Algeria). The communication will attempt to formalize an anthropological approach to the fact and ways of using this raw material in prehistoric Africa. Parmi les matériaux durs d'origine animale, il en est un - la coquille d'œuf d'autruche - qui apparaît emblématique de l'Afrique du fait de sa portée trans-régionale et trans-chronologique, tant il s'assimile encore de nos jours à un mode de subsistance et/ou à une mobilité en particulier sur ce continent. De par sa forme, ce matériau est d'une apparence toute utile dans son état naturel. Néanmoins, gravé ou encore réduit en fragments régularisés en autant de grains, le test d'œufs d'autruche rend aussi compte de différentes conceptions dans son utilisation. On s'interrogera sur le sens à donner aux différentes chaînes de transformation alors recueillies de l'analyse des travaux ethnographiques descriptifs et des données publiées des sites archéologiques fouillés, inclus quelques aspects des pièces partiellement publiées des fouilles de Jacques Tixier à Bordj Mellala (Algérie). La communication tentera de formaliser une approche anthropologique du fait et des façons d'utiliser ce matériau en Afrique préhistorique.

Mots-Clés: Africa, prehistory, shell, scheme, concept

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L'exploitation non alimentaire des coquilles marines durant la fin des temps préhistoriques en Afrique du Nord-ouest

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Les populations préhistoriques d'Afrique du Nord-ouest ont exploité les mollusques marins dès le Paléolithique moyen, en tant que ressource alimentaire, mais également en tant que matière première. En effet, les coquilles de ces mollusques, de par la grande diversité de leurs formes, couleurs et dimensions, offrent un support très apprécié pour la confection des éléments de parure, notamment les pendeloques. L'examen des collections de certains sites préhistoriques tels que Tamar Hat ou Medjez II, combiné à une lecture critique de la documentation bibliographique disponible, a permis de reconstituer les modalités d'exploitation de ces coquillages en se basant sur l'identification des espèces exploitées, les techniques mises en œuvre pour la confection des objets et leur mode d'utilisation. Il en résulte une variation diachronique et synchronique des systèmes d'approvisionnement et d'exploitation de ces coquillages entre les différentes cultures préhistoriques du Paléolithique supérieur, Epipaléolithique et Néolithique nord-africain.

Mots-Clés: Afrique du Nord, Paléolithique supérieur, Epipaléolithique, Néolithique, coquilles marines, éléments de parure.

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Prehistoric fishing in the light of ethnographic data from Africa

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During these last decades, plethoric studies conducted on ichthyofauna and stable isotopes in osseous materials revealed human subsistence was also primarily based on fishing in prehistoric Europe. However, if fish bone deposits can only attest to fish consumption in settlement sites, fishing evidence would then reveal a practice dated not earlier than Mesolithic (circa 8th-6th millennia cal BC) through the occurrence of certain perishables materials implemented for instance as various kinds of bone hooks. This gear appears soon after that climate became warmer and melting ice in liberating tons of micro-organisms begun to attract thermophilic fish species spreading farther north. Various fish species became a regular resource along coastlines of archipelagos which therefore were also occupied by human groups. The growing importance of (fish) bone floors found at coastal and inland lake sites suggest that pelagic and lacustrine areas were wholly integrated in human mobility. This raises the question of how social dynamics were driven by fishing as a common regular activity in the way human groups used these particular areas which, as a consequence, 'moulded' into cultural geographies discernible from an anthropological approach. Bone hooks appear as a main clue to understand how prehistoric groups territorially managed their subsistence. Because these principally derived from bone parts obtained from large terrestrial mammals' hunts, fishing then meant that Mesolithic groups used very different ecosystems in a same area with implications on strategic topographical location of settlement sites, possible social distribution of activities towards subsistence and special fishing techniques. Through several ethnographical case studies, we propose to explore the variety of fishing implements used by subsistence fishers in Africa and examine the exact conditions under which the precise fishing technique was narrowed down to hooks. We postulate that raw material used to elaborate this fishing gear is not significant enough not to theorize on how to discriminate postglacial strategies from the same kind of gear. This would allow us to enlarge our vision on fishing principles and better highlight types of fishing in prehistoric archaeology.

Mots-Clés: Fishing, Fishhooks, Ethnography, Subsistence strategies, Bone industry

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Changes in Climate, Environment, and Populations in Northern Malawi as reflected in Bead Assemblages

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Since 2016 the Malawi Ancient Lifeways and Peoples Project has been excavating and analyzing materials from four sites (Hora 1, Hora 5, Mazinga 1, and Kadawonda 1) in the Kasitu Valley of Northern Malawi. The deposits at these sites span the terminal Pleistocene to Holocene (ca. 30,000 – present), and include the Last Glacial Maximum, as well as a substantial Early Holocene (11.7 – 8.2 ka) component. These two time periods potentially represent very different climatic and environmental conditions in the region, which provides opportunity to examine bead manufacture in the larger context of resource availability and population demographics. Hora 1, dating from 21 ka – present, has also yielded multiple human burials that suggest the site had sustained cultural significance. Disc beads made in hard animal materials have been recovered from all represented time periods. Here, we report trends in the manufacture of beads at these three sites that correspond with changes in climate, environment, and potentially also human populations. One important trend is a shift from ostrich eggshell (OES) to land snail shell (LSS) as OES disappears from the record toward the end of the Pleistocene. There is also a new addition to bead morphology with the appearance of elliptical, or "cat's eye" beads that may coincide with the arrival of agro-pastoralist populations with the Bantu expansion. Trends in bead production at these sites show a flexible adaptation of existing technologies to changing raw material abundances, rather than maintenance of specific raw material traditions through large-scale trade.

Mots-Clés: ostrich eggshell, land snail shell, bead, adornment, Malawi

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The latest bone industry records from the Holocene site of Columnata (North-Western Algeria)

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Excavations of the Iberomaurusian and post-Iberomaurusian levels of the Holocene site of Columnata (Tiaret, western Algeria) have yielded numerous bone fragments, many of which were partially or totally transformed. Among the groups determined, the perforating group is the most important, which suggests a specialization and greater needs linked to specific activities. In the Columnatian layer, polishing becomes systematic and both proximal and distal parts become active.
High-resolution examination of the surfaces provides an insight into both the manufacturing processes and the evidence of use. The comparison of these data with what is known about the Mediterranean Epipaleolithic and Eastern Capsian traditions highlights the locality's distinctiveness and provides information on technological evolution during the Lower and Middle Holocene.

Mots-Clés: Bone typology, Bone technology, Fracturing, Taphonomy, Wear traces, North, western Algeria, Holocene, Iberomaurusian, Columnatian

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S25-A: Prey and Hunters: exploring subsistence strategies from the Pleistocene to the Early Holocene.

Neandertal selective hunting of roe deer? The example of Riparo Tagliente levels 35-36 (MIS 3-4, Italy)

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In southwestern Europe, during the Upper Pleistocene, a monospecific hunting strategy was a behaviour highlighted, in particular for medium and large-sized ungulates. However, the specific prey selection of small-sized ungulates was less common, especially for Neandertal groups. The revision of the faunal assemblage of two Mousterian levels with a zooarchaeological and taphonomic approach shows how roe deer species dominates the faunal spectrum of Riparo Tagliente (Italy). Riparo Tagliente is a rock shelter located in the Venetian Pre Alps, discovered in 1958 and excavated from the 1960s. Our taphonomic results indicates that the accumulation is almost exclusively anthropogenic. An intensive exploitation of the carcasses, with all the butchery steps of the *chaîne opératoire*, especially the systematic marrow recovery, even for the part less marrow quantity such as phalanges, is identified. The presence of foetal or new-born remains might indicates, at least, spring occupations. The Neandertal groups had a selective hunting strategy of roe deer and selective transport of the best part of other animal carcasses such as moose, red deer, bison or horse. The subsistence strategy shows a repetitive pattern along the sequence where the Neandertal prey selection was rather focus on a low-ranked species (in term of cost-returns). Therefore, the intense exploitation of roe deer, the high degree of the anthropogenic bone breakage, and the presence of infantile individuals could be indicative of nutritional stress episodes suffered by those Neanderthals that dwelled Riparo Tagliente at the beginning of MIS3. SUBSILIENCE project investigates how this causes affected their final decline. SUBSILIENCE is an ERC-CoG project funded by ERCEA (ref 818299).

Mots-Clés: Middle Paleolithic, Zooarchaeology, Taphonomy, Subsistence strategies, Roedeer

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Large-sized games and seasonality: results on the estimation of the season at death at De Nadale Cave, a single-layered Quina Mousterian site in the north-east of Italy.

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The analysis of Neanderthal mobility patterns offers valuable information about the spatial temporal organization of this past hominid and about his capacity to schedule. In this context the study of the seasonal organization of the activities (site occupation and hunting strategies) are of prime interest for documenting the choice made by Mousterian population for exploiting their territory.
In zooarchaeology, some valuable methods can be applied to teeth, such as the analysis of carbon and oxygen stable isotopes, the study of tooth eruption and replacement patterns, the dental micro- and mesowear analyses and the cementochronology technique. However, using one of these methods alone, may not always be reliable, since, when used independently, a certain technique may provide too low-resolution data and limited information. Hence, this contribution focuses on the seasonality and the extent of the occupation of De Nadale Cave, a single-layered Quina Mousterian site located on the Berici Hills, in north-eastern Italy. Moreover, the area is a key region for the study of the behavior of hunter-gatherer groups, thanks to the numerous and important prehistoric evidence spanning from the Middle to the Upper Palaeolithic.
Here we present the results obtained through a combined approach based on two high-resolution proxies, cementum increments and dental meso- and microwear. We analyzed molars from large-sized games, mainly cervid and bovid, which were the base of the subsistence of Neanderthal groups at the site. Despite some taphonomic alteration of the material, we were able to characterize the hunting seasonality of the different prey and estimate the duration of the occupation

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of the Quina layer. Our results bring new insight into the occupational pattern in the North-east of Italy during the MIS 4.

Mots-Clés: Seasonality, cementochronology, tooth wear, Middle Palaeolithic, large, sized games.

Modern humans at La Viña rock shelter (northern Spain) during the Aurignacian between H4 and H3 climatic events

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While the Aurignacian appears around 43 ka cal BP in northern Iberia, the arrival of the first Anatomically Modern Humans at the westernmost point of the Vasco-Cantabrian region (Marín-Arroyo et al 2018) does not occur until a few millennia later at La Viña rock shelter. This site contains evidence of repeated human occupation during the time of span of the Aurignacian culture. Recent chronological dating anthropogenically modified ungulate remains using ultra-filtered collagen, situate the early Upper Paleolithic groups between 37.5-33.6 ka cal BP in the western sector of the site, over ancient eroded Mousterian occupations. The goal of this work is to present the data about the paleoconomic behaviour undertaken by Aurignacian human groups and the environmental information at the time they dwelled in the western (levels XIII, XII,XI and VIII) and Central (IX, IX inf and VIII) sectors within the site. Macrofaunal remains, from both the central and western sectors, were studied from a multidisciplinary perspective: taphonomy to discern the origin of the bone accumulation; archaeozoological to unravel the human subsistence and stable isotope analysis on red deer to provide environmental data. The results indicate a high fragmentation rate of the bone assemblage. Despite that, dual exploitation of red deer and chamois is observed, revealing exploitation of mixed open and forested landscapes. Bone breakage indicates intensive carcass exploitation for meat, grease and marrow. Seasonality data obtained of some individuals indicates a spring occupation. The δ13C values reflect an open landscape with C3 plants and a low density of tree cover. The δ15N values are stable throughout the three levels but are higher than later parts of the sequence, which might suggest slightly drier conditions. These results thereby provide the first paleoeconomic and paleoenvironmental data of an important early and evolved Aurignacian sequence in the Vasco-Cantabrian region.
Marín-Arroyo, A.B., et al. 2018 Chronological reassessment of the Middle to Upper Paleolithic transition and Early Upper Paleolithic cultures in Cantabrian Spain. PLoS ONE 13(4): e0194708.

Mots-Clés: La Viña, Aurignacian, Iberia, MIS3, subsitence

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Late Upper Palaeolithic subsistence strategies in the southern Istria (Croatia)

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Ljubićeva cave is situated in Istria, near Marčana and has been recognized as an important archaeological site since the first excavations in 2008. New excavations at the site started in 2020 as a part of the project funded by the Croatian Science Foundation (grant IP2019-04-7821), concentrating on its Upper Pleistocene deposits that yielded numerous faunal remains in association with Epigravettian lithic assemblage. This study presents the analysis of the mammalian assemblage recovered in the new excavation (2020) and compares them to unpublished data on the material from the previous excavations (2008-11). Taxonomic analysis of the mammalian assemblage shows taxa characteristic of a range of habitats. Majority are adapted to temperate conditions with open steppe-grassland and parkland environments, indicating consistence over time. Detailed taphonomic analysis revealed numerous traces of butchery and food processing, but also the evidence of large predators (cave hyena). Foetal and neonate bones of large game are good seasonal indicators but also may be indicative of choices made by the local Epigravettian hunter-gatherers. Overall, the Ljubićeva cave faunal assemblage provides important data for understanding of the Late Upper Palaeolithic hunting and consumption practices in the wider region of the northern Adriatic and central Mediterranean.

Mots-Clés: Upper Palaeolithic, zooarchaeology, taphonomy, hunting, Adriatic

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Chamois exploitation in central Italy during the Pleistocene and early Holocene.

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The chamois is an agile animal that prefers harsh and impervious terrains and this may have contributed to make it a difficult prey to capture. The aim of this study is to investigate the importance of chamois in human subsistence in central Italy, also in relation to the exploitation of other ungulates.
There are currently two species of chamois in Italy: the Alpine chamois (*Rupicapra rupicapra*) and the Pyrenean chamois (*Rupicapra pyrenaica*). This situation is already evident in the Late Pleistocene and early Holocene, and, on the basis of palaeobiogeography, all the remains found in the Alps and the northern Apennines can be attributed to the first *taxon*, while those from the central and southern Apennines may be referred to the second one.
The Pyrenean chamois is often found in Epigravettian sites in central Italy, but only in rare cases it is the most frequently hunted animal. It is prevalent among ungulates with percentages of over 40% at many sites of the Fucino area: Grotta Maritza, Grotta di Pozzo-upper levels, Grotta La Punta, Grotta di Ortucchio. It is well represented with frequencies around 20% at Riparo-Grotticella di Santa Maria, Riparo Piastricoli and Grotta Mora Cavorso. The data on seasonality indicate that hunting took place preferably between summer and autumn and the traces of butchery, when indicated, show intense exploitation of carcasses. In all the mentioned sites, chamois is always associated to ibex and red deer, which are always present with relatively high percentages, reflecting the different environments exploited and the high degree of mobility, especially the vertical one, of Palaeolithic/Mesolithic hunter-gatherer groups.

Mots-Clés: Zooarchaeology, Taphonomy, Subsistence strategies, Chamois

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Refitting bones to reconstruct Neanderthal dwelling space use: the case of Fumane Cave (Verona, Italy)

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Neanderthals' spatial organization reflects different types of adaptive modes in response to internal and external constraints. A multidisciplinary study of the archaeological record, spatial analysis, and bone refits, compared with ethnographic data, is used to identify relevant aspects of space management, which constitutes a formal tool for interpreting the Palaeolithic record. 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 proximity were used for the same task and that artefacts were usually discarded where they were used. In this regard, refitting studies provide valuable data to achieve topics like assemblage formation processes, post-depositional dynamics, settlement patterns, definition, and integrity of stratigraphic units. The distribution of remains and documented connection lines allows understanding the space use and, consequently, human behaviour. Although these premises, faunal refits have hitherto been poorly applied in archaeological sites.
This paper aims to present the application of an innovative methodology applicated to the Middle Palaeolithic units A9 (47.6-45.0 Ky Cal BP) and A6-A5 (44.8-42.2 Ky Cal B.P.) of Fumane cave (Verona, Italy) that will include refits, spatial archaeology, multivariate statistic techniques and 3D model reconstructions. This latter will be an excellent way to record and transfer scientific information, and the possibility to automate or semi-automate refits of large faunal assemblages would offer new insights into zooarchaeological research methods.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the *Marie Sklodowska-Curie*, Grant Agreement N∘897841

Mots-Clés: Fumane cave, Neanderthal, behaviour, bone refits, 3D modelling

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New data on subsistence strategies during the Mesolithic in the Adige valley (TN)

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This research aims to critically analyse the data related to the exploitation of faunal resources in the Mesolithic sites of Riparo Pradestel and Riparo Romagnano Loc III (TN), located in the Adige valley.
The sites are well known for their complete stratigraphies that embrace the entire Mesolithic period, from the Early Sauveterrian to the Late Castelnovian. The aim of this research is to obtain new information about taphonomy and seasonality and to reconsider published data in order to better outline the scenarios and behaviours related to the subsistence strategies of the Mesolithic hunter-gatherer and fisher groups in the Adige valley.

Another important point of this study is to analyse data relating to the exploitation of freshwater resources in the Adige valley. For doing that, an estimate of the informative potential of the sample is proposed regarding fish and molluscs, while mammal remains of species linked to aquatic ecosystems such as beaver (*Castor fiber*) and otter (*Lutra lutra*) have been quantitatively and qualitatively analysed.

Mots-Clés: Mesolithic, Adige valley, strategies of subsistence, taphonomy, seasonality.

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Cave bears in the menu: hunting or scavenging at the Toll Cave (Moià, Barcelona, Spain)

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Humans and cave bears coexisted in many environments during the Late Pleistocene. However, demonstrating regular contacts and direct confrontation between them is a complicated task which usually requires specific taphonomic evidence, such as the presence of cutmarks on bears' bones or toothmarks on human bones. Here, we want to tackle this problematic in the Toll Cave (Moià, Barcelona, Spain), where one of the most meridional populations of these animals was discovered during the 50' of the past century. Unfortunately, the collections recovered during those years were lost. Currently, a recent project of research restarted the works in this cave and allowed to recover significant remains of these animals. As previous studies, the current ones point out the presence of bears because of hibernation. Most of the specimens show evidence

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of carnivore damage inflicted mainly by other bears and hyenas. However, the presence of a small collection of lithic tools and cutmarked bones seems to indicate sporadic visits of human groups to the cave to take advantage of these carcasses. Although the anthropogenic evidence is not conclusive enough, the site allows to discuss about the regularity of these visits and the modalities of access to these cave bear carcasses developed by these human groups.

Mots-Clés: Cave bears, hunting, scavenging, Toll Cave, Moià, Barcelona, Spain

S26-A: Pyroarchaeology from hunter-gatherer contexts to sedentary and complex societies

23 oral communications for the Pyroarchaeology session of the Virtual XIX UISPP congress (NO ABSTRACTS)

Christopher Miller *† [1], Carolina Mallol * ‡ [2]

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Pyroarchaeology Session at the Virtual XIX UISPP congress, Monday Sept 6th, 2021

Session organizers: CE Miller, C Mallol, S Gur-Arieh, MC Stahlschmidt
Time Zone: Central European Summer Time
8.50 Introduction

1st Part Moderator: Miller

9.00-9.15 CEST Sally Hoare, Rosa M. Albert, Ian Stanistreet, Karen Halsall, Mareike Stahlschmidt, John Gowlett - New Investigations of Fire-Related Interglacial sediments from Beeches Pit, Suffolk, MIS 11

9.15-9.30 Zane Stepka, Ido Azuri, Liora Kolska-Horwitz, Michael Chazan, Filipe Natalio - Evidence for fire in an open-air Lower Paleolithic site: Evron Quarry, Israel

9.30-.09.45 Michael Walker - Before pyrotechnology: pyroepignosis in the Lower Palaeolithic

9.45-10.00 William Chase Murphree and Vera Aldeias - The Evolution of Pyrotechnology in the Upper Paleolithic of Europe

10.00-10.15 Maria-Carme Belarte, María Pastor, Carme Saorin, Josep Pou, Georgina Castells, Marta Portillo, Jordi Morer, Joaquín Fernández, Marta Mateu, Sílvia Vila, Valentina Pescini and Alessandra Pecci - An experimental approach to the study of Iron Age combustion structures in northeastern Iberia: the TRANSCOMB Project

10. 15-10.30 David Friesem, Timna Raz, Leore Grosman, Shira Gur-Arieh, Reuven Yeshurun, Mina Weinstein-Evron Early trajectories of advanced pyrotechnology among the Natufians in

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the Southern Levant

10.30-10.45 Break

2nd Part Moderator: Mallol

10.45-11.00 Andrew C. Sorensen - Neandertals and Tinder: Adding powdered manganese dioxide (MnO2) may have increased their chances of "getting lucky" when making fire

11.00-11.15 Elysandre Puech, Marion Bamford, Isabelle Thery-Parisot - Into the hearth : floristic composition, structure arrangement and taphonomy of Later Stone Age combustion features at Bushman Rock Shelter (Limpopo, South Africa)

11.15-11.30 S. Amicone, M. Rogier, A. Memmesheimer, M.A. Qarni, J. Seidler, T. Kiemle, P. Sconzo, L.F. Morandi, S. Gur-Arieh, C. Berthold, C.E. Miller, H. Napierala, K.G. Nickel - An interdisciplinary approach to the study of kiln firing: a case study from Campus Galli

11.30-11.45 Bastien Rueff - Pyroarchaeology applied to Cretan Bronze Age lamps. An experimental methodology

11.45-12.00 Enrique Fernández-Palacios, Juan Francisco Navarro Mederos, Carolina Mallol - Aboriginal dung burning practices in La Palma (Canary Islands): The Buracas Cave fumier

12.00-12.15 Margarita Jambrina-Enríquez, Carolina Mallol, Gilliane Monnier, Gilbert Tostevin - Characterization of n-alkanes in combustion layers from the Middle Palaeolithic sedimentary sequence of Crvena Stijena rock shelter (Montenegro)

12.15-13.15 Lunch Break

3rd Part Moderator: Gur-Arieh

13.15-13.30 T. Buonasera, G. Gallo, L. Enbring, J. Eerkens, M. Arellano, C. Nijmeh, G. Parker - Preservation of Amelogenin Peptides in Thermally Altered Tooth Enamel: Proteomic Sex-Estimation of Burnt Skeletal Remains

13.30-13.45 Javier Davara, Margarita Jambrina-Enríquez, Caterina Rodríguez de Vera, Carolina Mallol - Exploring the lipid signatures of pine tar production under different combustion conditions

13.45-14.00 Natalia Égüez, Tammy Buonasera, Antonio V. Herrera-Herrera, Carolina Mallol - Biomarkers under fire. Experimental burning of animal dung to explore the thermo- oxidative degradation of its lipid content

14.00-14.15 Margarita Jambrina-Enríquez, Caterina Rodríguez de Vera, Javier Davara, Antonio V. Herrera-Herrera, Carolina Mallol - Characterizing pine as fuel: Molecular biomarkers and compound-specific isotope analysis of fatty acids in pinewood, resin exudates and sediment from experimental fires, laboratory heating sequences and wildfires

14.15-14.30 Caterina R. de Vera, Margarita Jambrina-Enríquez, Javier Davara, Antonio V. Herrera- Herrera, Carolina Mallol - Characterization of lipid compounds produced during combustion in experimental fires, laboratory heating sequences and wildfires. A comparative ap-

proach using fresh and dry anatomical parts of Pinus canariensis

14.30-14.45 Laura Tomé, Margarita Jambrina-Enríquez, Natalia Égüez, Antonio V. Herrera-Herrera, Javier Davara, Enrique Fernández-Palacios, Matilde Arnay de la Rosa, Carolina Mallol - Investigating fuel sources in highland archaeological contexts: the case of Las Cañadas del Teide (Tenerife, Spain)

14.45-15.00 Break

4th Part Moderator: Stahlschmidt

15.00-15.15 Aylar Abdolahzadeh, George M. Leader, Li Li - Heat exposed lithics: an experimental approach to quantifying potlids by temperature

15.15-15.30 Will Archer, Mareike C. Stahlschmidt, Susann Heinrich - Exploring Heat Treatment of Silcrete Artefacts Through Non-destructive Infrared Analyses

15.30-15.45 Cruz Ferro-Vázquez, Carolina Mallol, Phillip Nigst and Vera Aldeias - Colourimetric data can provide a reliable identification of burned sediments and an estimate of heating temperature

15.45-16.00 Michael Toffolo, Stéphan Dubernet, Francesco Berna, Eugenia Mintz, Jeffrey Chadwick, Aren Maeir, Elisabetta Boaretto - Micro-contextual characterization of aragonite diagenesis in archaeological ash

16.00-16.15 Ségolène Vandevelde, Toomaï Boucherat, Adelphine Bonneau, Damien Deldicque, Jean-Luc Lacour, Céline Quéré, Jacques É. Brochier, Christophe Petit, Ludovic Slimak - ExTraS Program: documenting processes of fixation, recording and preservation of combustion products in speleothems

Mots-Clés: Pyroarchaeology, hunter, gatherer contexts, sedentary and complex societies

S27-A: The management of prehistoric sites and the dynamics of contemporary societies: World Heritage and beyond

Enhancement of the invisible heritage: the case of the Ethnological Archaeological Civic Museum of Modena

Cristiana Zanasi *† [1]

[1] Musei civici, Palazzo dei Musei – Italie

The Ethnological Archaeological Civic Museum of Modena preserves a collection of about 180 flint artefacts, mostly dating back to the Lower and Middle Paleolithic, from the French sites of Montières les Amiens, Abbeville, Saint Acheul and Renancourt les Amiens. The collection was sold in 1891 to the Institute by Charles Le Beuf, an antiquarian and police chief of the town of Meaux, from which Carlo Boni, director of the Civic Museum, had purchasednumerous finds to enrich the collections.
The project of study and enhancement of the collectionis part of the rediscovery of collections "invisible" to the public.

The first "rediscovered" collection was the Egyptian one, formed in the years immediately following the foundation, in 1871, of the Civic Museum. The enhancement of this small collection has become a great opportunity for research. Thanks to the network of collaborations activated by the Museum, the best experts in the sector has been involved by combining scientific and humanistic disciplines.

The enhancement of the project took place through multiple initiatives aimed at all types of audiences: the live restoration of a child mummy was proposed, the 3D facial reconstruction of the child's face, the guided tours to tell the many "Stories of Egypt" - title of the exhibition - that emerged from the research, the educational courses and workshops for children as well as the in-depth meetings.

The second appointment will be dedicated to the French Paleolithic collection, rediscovered thanks to the collaboration with the Department of Humanities of the University of Ferrara. Also, in this occasion, the archaeological study of the material was accompanied by research on how to create a collection with a strongly evocative value. In fact, it was Boucher de Perthes, the pioneer of the prehistoric studies, who first collected many artifacts from the Paleolithic in Abbeville, in the first half of the 19th century, and associated them with paleontological remains. This and other discoveries started the studies of Prehistory in Europe and had great importance in the debate between creationists and evolutionists that contributed to the birth of Prehistory as a scientific discipline and to the foundation of museums such as Modena, which in 2021 will celebrate 150 Anniversary.

On the enhancement front, on the one hand we intend to give space to those issues that allow us

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to communicate the topicality of prehistory, such as migration and mobility, environmental sustainability, climate change, nutrition; on the other, initiatives have been designed to stigmatize the stereotypes that accompany the imagery of prehistory with paradigms of true / false, projection of films, animations and documentaries and an original exhibition of the famous advertising stickers of the Panini collection, a unique collection preserved in Modena, which represents a mirror of society between the 19th and 20th centuries.

An interactive thematic itinerary dedicated to understanding the "technological gesture" will be dedicated to the primary school public; for high school students, in particular for the art institute, experiential sessions will be proposed starting from the "design" of an iconic prehistoric artefact.

Mots-Clés: Museums, collections enhancement, Italy

Hill forts and pre-proto-historic enclosures. Problems and potencialities to an european Heritage.

Davide Delfino * [2,1]

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[1] Ministero della Cultura- Direzione Regionale Musei Molise – Italie

In large parts of Europe, walls, fences, berms or ditches around settlements or ritual places became increasingly significant from the Chalcolithic to the Iron Age. Several features have been discovered, relieved and interpreted since the 19th century. These signs left in the landscape from more than 5000 years ago, mark not only the will of human groups to mark the territory, but also precise settlement and architectural choices on certain occasions. They are also, between the Late Bronze Age and the Iron Age a factor that unites many European regions: British Isles, Iberian Peninsula, Peninsular Italy, Balkans, Central Europe. It is an archaeological heritage that is fundamental for understanding the management of the territory in the first complex societies, but in the same time subject to a double problem: the difficulty, in many cases, of making it attractive and open to the public and, consequently, the risk of seeing it forgotten and abandoned to degradation in inaccessible mountain areas. The problem of the protection and enhancement of this type of pre and protohistoric archaeological heritage will be addressed in the work, with a focus on the case study of the hillfort in the middle valley of the Portuguese Tagus

Mots-Clés: Hillforts, Europe, Preservation, Valorization

*Intervenant

Overcoming physical and figurative walls: social, cultural and pandemic-related challenges of public outreach in a suburban Pleistocene Museum in Rome

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[4] Dipartimento di Scienze dell'Antichità - Università di Roma "Sapienza" – Italie
[5] Dipartimento di Beni Culturali - Università del Salento, Lecce – Italie
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[7] Independent researcher – Italie

The Pleistocene Museum of Casal de'Pazzi (Rome, Italy) is characterised by peculiar history and features. Officially opened in 2015, it was originally built to preserve a portion of an important archaeo-palaeontological deposit found during urbanization works, and has progressively become a cultural and social landmark, thanks to the efforts of the institutions that have promoted its constitution.
The Middle Pleistocene site of Casal de'Pazzi (ca. 350-200 ka BP), discovered in the early 1980s, consists of a dry palaeoriver that has yielded thousands of fossil faunal remains and lithic artefacts, as well as plant fossils and a single skull fragment of a hominin species. Among the most striking finds are many intact or sub-intact straight-tusked elephant's tusks, that are often mistaken for mammoth remains by the general public.

In a way, the Museum could be considered as "doubly marginal": on one hand, it is located in the socially-problematic NE suburbs of the city, far from the main tourist routes and from Rome's traditional centers for cultural activities; on the other, it is one of the few prehistoric-themed attractions in the capital of the - somewhat cumbersome - ancient Roman civilization, making even more difficult to correctly communicate the characteristics and meaning of the prehistoric deposit preserved, not to mention Prehistory in general.

Nonetheless, or perhaps precisely because of this, the Museum of CDP has always stood out for the quantity and quality of innovative methods of public outreach experimented throughout the years. Starting from the involvement of local street artists and cartoonists, to the development of 3D, sensory and virtual reality reconstructions, including an educational video-game inside the display room; from the promotion of activities with socially and culturally disadvantaged

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locals, to the realization of sign-language translations and tactile scale-models, this institution has never ceased inventing and re-inventing new ways to become more and more accessible to all sorts of public.

In this context, the pandemic has represented a big challenge, making impossible to physically visit the Museum and to interact directly with schools, inhabitants of the neighborhood, groups of people with special needs and tourists. This crisis, however, has not stopped the will to communicate Casal de'Pazzi's prehistoric heritage effectively and widely, leading the Museum staff and collaborators to engage more in the use of social media, online meeting systems, and digital innovation technologies.

This paper will seek to analyze and reflect on the effectiveness and usefulness of such methods of public outreach in prehistory-related cultural heritage, both in a context of forced distance and in a "new normal" condition, with the aim of becoming ever more successful in communicating prehistoric contents, prehistoric-related research issues and their overall cultural and social value, in a world that often tends to dichotomize the knowledge of the past and the reality of the present.

Mots-Clés: Pleistocene, suburbs, accessibility, Rome, museum, prehistory

The role of archive records in archaeology: the experience of the Archive of the Archaeological Museum in Kraków

Marzena Woźny * [1], Dagmara H. Werra *

2

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The Archive of the Archaeological Museum in Kraków keeps records spanning more than 170 years (since 1850) of archaeological research, including excavations, and the history of various archaeological institutions. They provide information to numerous archaeologists every year. Archive records prove indispensable to researchers who start excavation at sites already explored in the past. They also preserve precise drawings, photographs or descriptions concerning artefacts that have been lost and now are known solely from the literature. Moreover, the records can be useful in contemporary archaeology; for example, they help to locate graves from the First and Second World Wars.

Archaeological sources include the Polish Archaeological Record, a project implemented in Poland since the 1970s when the whole country was divided into rectangles, each with an area of 20 square kilometres. Archaeologists have been given the task of exploring these sectors through surface survey and careful study of uncovered artefacts and the literature. The project relies on archaeological archives as well, because they contain information, often obtained many decades ago, about finds that have since been forgotten.

This paper presents diverse archive records and shows the ways of using them in archaeology. It also discusses the most frequent problems encountered by archaeologists studying the archives.

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Mots-Clés: archive, archive records in archaeology, Archaeological Museum in Kraków

*Intervenant

Brazilian Perspectives About National Heritage and Risks

Luana Campos *† [1], Aline Carvalho

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Nowadays, we have 1.121 heritages on UNESCO World Heritage List. In this amount, 53 heritages are on the List of World Heritage in Danger. In 2021, Brazil has 22 goods inscribed on the World Heritage List, which represent a large part of Brazilian cultural diversity, which includes archaeological goods, historical sites, cultural landscapes, indigenous cultures, religious and musical expressions. Until now, there are no Brazilian assets on the heritage list in danger; however, we analyze that this situation may change.

According to UNESCO, multiple factors can be dangerous to heritage: war and other types of violent conflicts, natural disasters, not planned and abuse uses of heritages, and others. Here, we will focus on Anthropocene and Climate Changes' effects on heritages. We already knew some examples of this situation: (1) the Archeological Zone of Chan Chan, Peru; (2) the Everglades National Park, United States; (3) the Abu Mena, Egypt; and (3) finally, the example of the Choir and its Port, Venezuela.

Nevertheless, what can we talk about Brazilian specificity? It's impossible not mentioned our Cerrado and Amazon biomes. We recognized both as essential to human life. The fires are more intense in the first case, and we don't have a public policy to deal with this. And, in the second case, dry seasons are longer, changing the landscape and the balance of life. Add to that, our authorities are incentivizing deforestation. Thus, we have a mix of Anthropocene, climate change effects, and a very singular public policy.

But we have other cases. And, in this presentation, we would talk about the Cais do Valongo (CV). CV is a world heritage site since 2017. For us, Valongo with the world heritage site is a conquest. Valongo is a material testimony about the lives, suffering, and resistance of thousands of enslaved Africans at Brasil. The discover contributed to our debate about dignity, human rights, equality, and other themes at present. And CV is not safe! It's located in the port region of Rio de Janeiro, at an altitude equal to zero to sea level, and it is having suffered constantly from the effects of rising sea and torrential rains! Cais do Valongo's problems are intensified in the face of the neglect of the local authorities in establishing preventive measures to protect the site or any other protective effort. Again, we are in front of a problematic Anthropocene, Clima Change, and Public Policies.

For us - women's heritage Brazilians researcher - Valong is an example of Brazilians heritage police. Therefore, it can be different. Systemic studies and collaborative practices could allow

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the attribution of indexes and vulnerability to archaeological interests, such as the studies that the research groups are developing, coordinated by the Laboratory of Archeology "Paulo Duarte" from the State University of Campinas, in the state of São Paulo. Support by international studies and valorizing the local experience, we aim to understand and map the primary natural, and cultural risks to Cais do Valongo. And, after that, to create a cooperative web to lead with this problem and develop solutions.

Mots-Clés: Brazilian Perspectives, National Heritage, Risks

Conservation et mise en valeur de l'art rupestre dans les zones à risque au Cameroun

Appoloinaire Kaji *† [1]

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Dans un processus de protection et de mise en valeur de son patrimoine culturel, le Cameroun a voté la loi n∘2013/003 du 18 avril 2013 régissant le patrimoine culturel au Cameroun.

Le vote de cette loi et son application détermine la volonté de l'Etat du Cameroun à favoriser la connaissance de tout ce qui constitue des témoignages matériels et immatériels de sa culture.

Le matériel archéologique et les représentations d'art rupestre font partie de ces témoignages culturels qui requièrent une grande attention de l'Etat du Cameroun , de la communauté scientifique nationale et internationale.

Avant d'aborder les questions de la conservation et de la valorisation de l'art rupestre au Cameroun, il est necessaire de faire une génèse des découvertes, faire un état des lieux, apprécier les travaux de recherche et les publications sur le sujet.

Le constat démontre que l'Etat seul, ne peut assurer eficassemnet la protection et la valorisation dudit patrimoine ; l'implication des communautés locales devient une necessité indispensable. La reflexion que nous impose ce constat est celle de voir comment toutes ces entités peuvent ensemble dans leurs roles contribuer à l'essor des travaux et recherches sur l'art rupestre au Cameroun.

A l'état actuel des découvertes au Cameroun, la majorité des sites d'art rupestre se trouvent dans l'aire culturelle soudano-sahélien au niveau de la zone des quatre (04) frontières à savoir : le Cameroun ; le Tchad ; le Nigeria et la Centre-Afrique ; cette zone étant en proie aux crises socio sécuritaires avec notamment la secte islamique Boko Haram, l'urgence de la sauvegarde et de la valorisation du patrimoine archéologique recommande donc l'implication des communautés locales et des autorités traditionnelles religieuses.

Mots-Clés: Conservation, mise en valeur, art rupestre.

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Construire un paysage culturel : un jeu de tensions

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Alors que certains sites sont intégrés dans la liste du Patrimoine Mondial, leur mise en valeur privilégie la description de leurs évidences fossiles, mais souvent ne considère au même titre les débats qui lui furent associés, lors de la reconnaissance de leur importance pas seulement historique, mais scientifique. Prenant les cas de Altamira, Lascaux et Foz Côa, on réfléchit sur la nature des débats théoriques sous-jacents et les mécanismes sociaux de construction et dissémination des connaissances. Sur cette base, on essaye de démontrer que la mise en valeur des sites préhistoriques recoupe les débats les plus importants de la contemporanéité, tels que les critères de validation des connaissances, les mécanismes d'adaptation aux changements climatiques ou la gouvernance des communautés humaines.

Mots-Clés: Paysage culturel

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La gestion des sites préhistoriques et la dynamique des sociétés contemporaines en Afrique de l'Ouest

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En Afrique de l'Ouest, les sites préhistoriques sont peu connus par rapport aux monuments protohistoriques ; aussi, les moyens humains et techniques à leur disposition restent très limités. Néanmoins, les découvertes actuelles confirment l'existence de nombreux sites stratifiés de chasseurs-cueilleurs, de pasteurs et d'agriculteurs ainsi que des traces qui corroborent des conditions climatiques favorables à l'occupation humaine.

Bien des preuves de leurs activités (bifaces et hachereaux du paléolithique ancien, armatures bifaciales et de pointes de flèche du paléolithique final, meules et molettes, gravures et peintures rupestres, harpons, haches, pièces microlithiques du Néolithique...), en surface dans les zones désertiques, ne sont pas épargnées par pillage ou le trafic.

Aucun site préhistorique ne figure sur la Liste du patrimoine mondial de l'UNESCO. Un seul site, celui du Parc W au Niger, mettant en valeur un peuplement paléolithique ancien, est présent sur une liste indicative. Sur les listes de sites et monuments classés des différents pays, de rares sites sont indiqués, mais aucun n'est délimité, ou ne dispose d'une zone tampon, ou d'un plan de gestion leur assurant une protection.

La reconnaissance par les archéologues nationaux des sites préhistoriques et leur classement par les autorités ne les mettent pas forcément à l'abri. En absence d'une archéologie préventive menée en parallèle aux grands travaux de développement (aménagement agricole, réalisation d'infrastructures routières, extension des zones urbaines), leur existence est menacée. La conservation des sites préhistoriques est essentielle pour la connaissance des anciennes activités humaines et de leur paléoenvironnement.

Mots-Clés: Gestion des sites préhistoriques, dynamique des sociétés contemporaines, Afrique de l'Ouest

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SHOWCAVE: a multidisciplinary research project to study, classify and mitigate the environmental impact in tourist caves

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Over the past decades, interest for the underground karst environments and its natural wonders has grown remarkably, not only from the scientific viewpoint, but also from an economic perspective. The so-called 'show caves' are caves made accessible to the public for touristic purposes, managed by a governmental or commercial organization. The numbers of visitors (up to 500,000/year/cave) and the profits deriving from such activities have recently gained importance at the global scale. The aim of this project is to provide an in-depth characterization of the environmental impacts related to tourist exploitation in the major Italian show caves. A multidisciplinary workforce, composed by five research units, is acting in the project, focusing on the biological, palaeobiological, geological, hydrogeological, archaeological and physical components of the cave environment with concrete opportunities of trans-disciplinary collaborations. The major Italian show caves have been involved to serve as model sites for the project. This paper will introduce the survey and state-of-the art of the Italian prehistoric show caves.

Mots-Clés: Prehistoric caves, management, tourism

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S27-B: The conservation of archaeological sites and cultural landscapes . Panel: Archaeological heritage policies and management structures

Effects of alteration on exposed artifacts produced by the influence of electromagnetic radiation applied to the azo chromophores

Carlos Cayón * [1]

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The following bibliographical work compile the improvements in artifact lighting systems aimed at museum or museum environments to enhance and safeguard the chromophoric qualities of delicate archaeological elements such as ceramics, mosaics or textiles in museum or musealized environments. Will be reviewed the main concepts of the processes of creation and interaction of electromagnetic radiation and how it is possible to quantify and detect the alterations that this supposes in the artifacts, as well as their sources. The main manifestations associated with photocatalytic processes in real cases of exhibited work will be recognized and studied, specifically, how electromagnetic radiation affects the azo group of chromophores in lake pigments, and the awareness of the different magnitudes that may exist in all these processes.

Mots-Clés: Light, photochemical, azo dye, electromagnetic radiation, art, archaeology

*Intervenant

Amas coquilliers : Un patrimoine culturel en péril du Sénégal à la Côte d'Ivoire

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Le Sénégal et la Côte d'Ivoire appartiennent au vaste réseau d'amas coquilliers qui s'étend des côtes de la Mauritanie à celles de l'Angola. Dans ce réseau, les coquillages ont constitué une part importante dans l'alimentation des populations littorales.
L'idée de cette étude est née du constat de l'exploitation intense de ces amas renfermant à l'occasion des éléments archéologiques. Les zones ciblées par cette communication sont au Sénégal le delta du Saloum et l'embouchure de la Casamance, en Côte d'Ivoire les secteurs du Dabou et de Jacqueville. Dans ces zones, après consommation des mollusques, les coquilles font l'objet d'usages secondaires divers qui limitent la constitution de nouveaux amas ou mettent en péril l'intégrité des dépôts anciens. Des activités destructives qui, combinées avec l'érosion des côtes et la destruction de la mangrove, nous impose de mener des actions en faveur de la sauvegarde des vestiges protohistoriques et historiques dont recèlent certains amas.

Mots-Clés: Amas coquilliers, classement, Côte d'Ivoire, législation, mangrove, mollusques, patrimoine archéologique, protohistoire, Sénégal

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SHELL MOUND MANAGEMENT AND RISK ANALYSIS IN THE BAIXADA SANTISTA REGION, STATE OF SÃO PAULO, BRAZIL

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This paper aims to present a case study referring to archaeological research carried out in the This paper aims to present a case study referring to archaeological research carried out in the Baixada Santista region, State of São Paulo, Brazil.
In this region there is a concentration of shell mound sites, most of which were destroyed in the first decades of the 20th century, to obtain material to pave the streets of nearby urban centres.

These activities showed a diverse material culture, including several human burials. From then on, archaeological research began, which resulted, among others, in the creation of the Law to protect the Brazilian archaeological heritage.

The region was the focus of several surveys and, more recently, of regional archaeological surveys that revealed the presence of new sites. These surveys also involved the participation of local fishing communities that, in some cases, are installed on the sites.

Thereafter, a preservation and risk analysis were carried out, including annual monitoring. The article summarizes these initiatives and presents the current scenario of the heritage involved, with a focus on the development of a Management Plan to ensure its preservation.

Mots-Clés: Shell mound archaeological sites, Brazil, management plan, risk analysis

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LANDSCAPE AS MEMORY: A CASE STUDY IN THE AMAZON REGION, BRAZIL

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This paper aims to present the results of research in the Madeira River basin, which integrates the Amazon region, Brazil.
The work includes the development of intensive archaeological surveys, integrated with an ethnoarchaeological program with indigenous communities that have historically occupied the region.

Space occupation studies include the definition of archaeological settlement patterns, added to the recording of memories about Cultural Landscapes recognized by communities.

The result of this research integrates different languages (Portuguese and Tupi Mondé) and languages (including Storytellers based on indigenous narratives).
The information collected is part of a wide Data Science supported by modeling of Social Territories. In this way, the result of the research also offers a management and preservation platform for the archaeological and cultural heritage for all stakeholders involved (especially the local communities).

Mots-Clés: Lanscape as a memory, ethnoarchaeology, Social Territory, Amazon Basin, Brazil

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CONCEPTUALIZING AN ARCHAEOLOGICAL AND BIOCULTURAL HERITAGE PARK IN CHONGOENE, GAZA PROVINCE, MOZAMBIQUE: COMMUNITY BENEFITS CONNECTED TO COASTAL SHELL MIDDENS AND ECOSYSTEMS.

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Chongoene District in Gaza province, Mozambique, hosts a number of important archaeological shell middens which are also of significant heritage value to local communities and for the country as a whole. These shell middens form the focus of this paper which aims to explore what is currently known about their origins and archaeological associations and current threats to their preservation and management. This paper will outline a possible way forward that includes the establishment of an innovative Archaeological and Biocultural Heritage Park, that places community stewardship and educational engagement at the centre of efforts to protect these sites and disseminate information about this rich heritage through informed, collaborative management.
The Chongoene shell middens provide essential cultural ecosystem services for local coastal communities and warrant protection as part of district-level cultural landscape preservation activities. They also provide testimony, beginning in the early first millennium CE around the transition from Late Stone Age hunting and gathering to early farming Iron Age modes of subsistence, to the changing interaction between humans and nature through the exploitation of the marine molluscs and other coastal resources over the *longue durée*.

We argue in this paper that despite having been known for many years and recognized as archaeologically important the preservation and conservation of these coastal middens in the dunes at

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Chongoene still present an overwhelming challenge to the Provincial Government authorities owing to the absence of any integrated coastal management plans for this section of Mozambique's coastline. Moreover, we contend that, if properly preserved and valued, these shell middens and their associated coastal ecosystem can contribute to fostering a deeper sense of environmental responsibilities and positive evaluation of maritime cultural heritage while also strengthening cultural attachments to place and generating economic opportunities through related investment in establishing biocultural heritage tourism. Their location close to the Indian Ocean with beautifully beaches can obviously attract visitors, while their scenic qualities and deep human history offer ideal qualities for promoting philosophies of local cultural stewardship and environmental conservation. Essentially, local people recognize themselves as part of this landscape that they have created over time, through shellfish collection, fishing and cultural engagement with the sea and its resources.

Mots-Clés: Shell middens, Chongoene, Ecosystems, Preservation, Biocultural Heritage, Local coastal communities

A FRAMEWORK FOR CULTURAL HERITAGE MANAGEMENT IN NATIONAL PARKS, MOZAMBIQUE: AN INTEGRATED APPROACH TO LANDSCAPE PRESERVATION

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This paper rests on the premise that the combination of heritage values and knowledge allows for a better integration of the development needs and a sound heritage management program based on local history and experience for landscape preservation. The paper draws on Mozambican national biocultural legislation, field inventories of heritage sites, the management plans and zonation of the park for a classification in terms of potential, values, cultural and natural significance, and risk/threat level of archaeological and historical sites, in Limpopo National Park and Gorongosa National Park. The example of this is the Conservation Area category of a cultural and natural monument. The argument of this paper is that the biodiversity protection can be combined with heritage management to facilitate a higher degree of community participation and ownership in conservation strategies and the development of activities. Cultural heritage can also be better displayed and promoted for tourism, which will provide opportunities for the use of the existing biocultural heritage to benefit local communities. In this paper we propose the framework and guidelines for the establishment of Interpretive centres to display and assist the management of cultural heritage in the parks. We also recommend integration of local culture in heritage management programs. This will enable an integrated and inclusive heritage management of the Parks.

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Mots-Clés: National Parks, Paleo archaeology, Historical ecology: Heritage management, Cultural and Natural Monument: Landscape.

AN ASSESSMENT SYSTEM FOR ARCHAEOLOGICAL SITES, THE EXAMPLE OF LIMPOPO VALLEY

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This paper builds on the classification system pioneered by Leonardo Adamowicz in his Cultural Heritage Impact Assessments. Following the work by Adamowicz, we present a classification system of archaeological sites in terms of integrity, research potential, and threat level in a simple three grade system. Adding to this we propose the inclusion of local heritage and nature value. We test the classification system on sites surveyed from 2006-2017 in Limpopo National Park (PNL). The study includes Adamowicz's Impact Assessment surveys for the prospected Mapai Dam. Sites dating from the Early Stone Age to the Later Stone Age have been identified in the areas as well as Farming Community settlements from both the first and second millennium AD. We have also mapped historical sites and ceremonial places which we suggest should be included in Heritage Assessments as a norm. We discuss the different categories of sites and define key areas for further rescue archaeology and surveys with respect to the prospected Mapai Dam. We also discuss the potential and problems of using a similar classification system nationally in Mozambique.

Mots-Clés: Limpopo National Park, Classification system, Integrity, Scientific potential criteria, Local historical value, Site type, Impact Assessment.

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SG: PALEOLITHIQUE MOYEN

Rozhok-1 open-air Middle Paleolithic site in the Azov Sea coast region, Russia: the new data from museum collections

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The north-eastern Sea of Azov region has an intermediate geographical location between the Caucasus Mountains and the vast Russian plain. Several sources of high-quality cretaceous flint that was widely exploited in the Middle Paleolithic (MP) are known in the region. Also, flint from these sources was defined in the Eastern Micoquian industry in Mezmaiskaya and Matuzka caves in the North-Western Caucasus, that are located about 300 km from the sources (Doronicheva et al., 2016).
Our current study is based on materials from the open-air site of Rozhok-1. The site is a multilayered stratified site, located in the north-eastern Sea of Azov region. It was excavated by N. Praslov (1968) in 1961-1962 over a total area of about 100 m2. Six cultural horizons with numerous animal bones and flint artefacts, associated with several hearths were identified by the excavator within one lithological stratum. The largest number of faunal remains from Rozhok-1 were attributed by V. Gromov to Bison priscus cf. longicornis, Bos sp., Megaloceros sp., Equus caballus, Equus (Asinus) hidruntinus, and Canis lupus (Praslov 1968: 71). Also, a human molar was found in horizon 4. This tooth bears traits of the European Neanderthals (Khaldeeva et al., 2020).

Today, the archaeological collection from the Rozhok-1 site is stored in the Taganrog state literary and historic-architectural museum-reserve in Taganrog (Rostov region, Russia; museum ID TLIAMZ KP-8993/-4245). We analysed in total 1299 lithic artefacts from 6 cultural horizons excavated on the site, including 42 flint artefacts selected for petrographic and geochemical analyses (Doronicheva et al., 2017). Electronic database was created for all tudied materials. Our research allowed to gather new data about hominid mobility and adaptations in the north-eastern Sea of Azov region during the Middle Paleolithic.

Doronicheva E.V., Kulkova M.A., and M.S. Shackley. Raw material exploitation and transport in the Northern Caucasus Eastern Micoquian. // PaleoAnthropology. 2016: 1-45 doi:10.4207/PA.2016.ART98

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Khaldeeva N., Kharlamova N., Otcherednoy A. Morphology of the upper second permanet human molar from the Middle Paleolithic site Rozhok I. Comparative analysis. Stratum Plus. 2020. Iss. 1. Pp. 361-370.

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Mots-Clés: Middle Paleolithic, Rozhok, 1 site, Lithic industies, Museum collections.

Flint procurement and exploitation in the Middle Paleolithic of the Northern Caucasus

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In the Northern Caucasus, special studies of lithic raw materials exploited in the Palaeolithic have started only since 2007, including surveying of outcrops that could be used in the Palaeolithic and study of petrographic characteristics of flint samples and artifacts (e.g., Doronicheva, Kulkova, Grégoire 2012; Doronicheva, Kulkova, Shackley 2013; Doronicheva et al. 2016; Doronicheva et al., 2019; 2020).
Since 2007, we create the reference collection of lithic raw materials source standards (lithotheque) of mainly siliceous rocks from outcrops in the Northern Caucasus, which now consists of more than 1000 samples from 60 outcrops and is stored in the Laboratory of Prehistory in St.Petersburg, Russia. Excepting 7 outcrops from the Elbrus region in the north-central Caucasus, 53 outcrops are from the north-western Caucasus. Flint outcrops from the north-eastern Caucasus are not studied yet. Most of the flint outcrops analyzed are related to primary geological contexts, although some are of secondary origin from redeposited geological contexts or from alluvial deposits.

Because flints can vary within the same outcrop, whereas flints from different outcrops often have a similar composition, we collected several visually distinguishable flint samples from different parts of each outcrop. Petrographic and geochemical analyses were done for the samples collected from different parts of each outcrop.

To identify groups of flint samples from geological outcrops and artifacts from MP sites that are characterized by a similar composition of chemical elements and originate from the same type of geological deposits, the data obtained using XRF and SEM were processed using statistical methodss.

Our research provides new data on flint procurement and exploitation in the Middle Paleolithic in the Northern Caucasus.

Research of raw material sources in the North-Central Caucasus is supported by the Russian Science Foundation grant No. 17-78-20082, "Human-nature interaction in ancient in the Central Caucasus: dynamics of environmental change and technological innovations, and adaptations of subsistence strategies". Research of raw material sources in the North-western Caucasus is funded by the grant No. 20-18-00060, "Trends of the cultural process during the Late Pleistocene in the North-Western Caucasus" from the Russian Scince Foundation.

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Mots-Clés: petroarchaeology, flint, geochemistry, Xray fluorescence (XRF), scanning electron microscopy (SEM), petrography, Middle Paleolithic, Northern Caucasus.

New data on hunting weapon of the North Caucasus Neanderthals

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Our research provides new data on hunting weapon of two different Neanderthal populations in the North Caucasus. The combined typological and use-wear analyses allowed us to distinguish obsidian spearheads in the Zagros Mousterian industry at Saradj-Chuko Grotto, located in the Elbrus region, in the north-central Caucasus. The obsidian artifacts identified as spearheads have characteristic morphological features and show use-wear traces that allowed us to determine how these spearheads were attached to the spear shafts, likely made of wood. Obsidian spearheads are defined for the first time in the Middle Palaeolithic of the Caucasus. The associated fauna suggests the obsidian spearheads from Saradj-Chuko were used for hunting ungulates, especially the Caucasian goat.
A unique bone point found in the Eastern Micoquian industry at Mezmaiskaya Cave, in the north-western Caucasus, allows us to discuss the Mousterian origin of specialized bone-tipped projectile weapon in Europe long before arrival of the Upper Paleolithic modern human groups to the continent. Results of use-wear analysis, Fourier-transform infrared microspectrometry, and μCT scanning indicate that the bone point from Mezmaiskaya was hafted on a shaft, likely made of wood, using an adhesive mastic composed mainly of bitumen with addition of natural resin. Zooarchaeological data suggests the bone point could be used for hunting small mammals.

Acknowledgments. The research of the bone point from Mezmaiskaya Cave was supported by the Russian Science Foundation (grant No. 20-18-00060, "Trends of the cultural process during the Late Pleistocene in the North-Western Caucasus"). The research at Saradj-Chuko Grotto was supported by the Russian Science Foundation (grant No. 17-78-20082, "Human-nature interaction in ancient time in the Central Caucasus: dynamics of environmental change and technological innovations, and adaptations of subsistence strategies").

Mots-Clés: Mousterian obsidian spearheads and bone projectiles, Neanderthal hunting weapon, North Caucasus

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Première occupation de la mer Égée centrale (Naxos, Grèce) : Dispersion et comportements des homininés vers l'Europe.

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La question des premières migrations dans les îles du bassin méditerranéen est complexe et a fait l'objet de longues controverses. En effet, la vision qui est restée longtemps dominante (Cherry, 1981) proposait une venue tardive des premières populations sur ces îles, il y a environ 7 000 ans, avec une arrivée plus tardive encore pour les îles cycladiques (autour de 5 000 ans). Les découvertes effectuées depuis une décennie, notamment en Crète sur les sites de Preveli à Plakias, remettent en question ce paradigme, montrant qu'il y aurait eu des occupations des îles dès le Paléolithique Moyen/Inférieur. Cependant, la communauté scientifique a besoin, afin de trancher définitivement en faveur d'une occupation précoce en mer Egée, de découvertes archéologiques incontestables, en stratigraphie et associées à des datations numériques justes et fiables.
Le site de Stélida, à Naxos, répond à ce critère puisqu'en plus des nombreux artefacts lithiques associés au Paléolithique Moyen (voir pour certains au Paléolithique Inférieur) retrouvés en stratigraphie, des datations par luminescence y sont associées. Ce site, probablement occupé pour l'approvisionnement en matière première siliceuse, est étudié depuis 2013 par notre équipe (dir. Tristan Carter) dans le cadre du projet SNAP (*Stélida Naxos Archaeological Project*), avec une étude géochronologique associée, initiée en 2016. Celle-ci consiste à dater la dernière exposition à la lumière des sédiments issus des couches stratigraphiques dans lesquelles ont été retrouvées les artefacts lithiques. Plusieurs protocoles en IRSL (*Infrared Stimulated Luminescence*) ont été employés afin de conforter les résultats obtenus. Les premiers résultats *terminus*

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ante quem indiquent une présence sur le site il y a, au moins, environ 200 000 ans. Ils nous indiquent une probable nouvelle voie de dispersion humaine vers l'Europe au Pléistocène Moyen.

Mots-Clés: Géochronologie, Mer Egée, Pleistocène Moyen, Naxos

For our world without sound. The opportunistic debitage in the Italian context: a methodological evaluation of the lithic assemblages of Pirro Nord, Cà Belvedere di Montepoggiolo, Ciota Ciara cave and Riparo Tagliente.

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The opportunistic debitage, originally adapted from Forestier's S.S.D.A. definition, is characterized by strong adaptability to local raw material morphology and its physical characteristics and it is oriented towards flake production. Its most ancient evidence is related to the first European peopling by *Homo* sp. during Lower Pleistocene starting from 1.6 Ma and gradually increasing around 1 Ma. In these sites, a great heterogeneity of the reduction sequences and raw materials employed is highlighted, bringing to the identification of multiple technical behaviours. However, the scientific community does not always agree on associating the concepts of *opportunism* and *method* to describe these lithic complexes. The same methodological issues remain for the Middle Pleistocene where, simultaneously to an increase of the archaeological evidence and the persistence of the opportunistic debitage, the first bifacial complexes are attested. Further implications concerning the increasing complexity highlighted in core technology management are now at the centre of an important debate regarding the genesis of more specialized method (Levallois and Discoid) especially during MIS 12 and MIS 9. We suggest that the opportunistic debitage could be the starting point for this process, carrying a great methodological and cultural potential within itself.

Mots-Clés: Lithic Technology, Lower Palaeolithic, Middle Palaeolithic, Core technology, Flake assemblages

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Up to the mountain and down to the river: a raw material approach to the Neanderthal flint assemblage of stratigraphic unit VIII of El Salt (Alcoi, eastern Iberia)

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Flint is the most predominant type of raw material used by Neanderthals for producing stone tools. It is also susceptible to physicochemical changes conditioned by the environment within which it is located. Hence, flint sourcing based not only on primary outcrops but also on secondary deposits may be a particularly suitable proxy of hunter-gatherer group mobility. Here, we present preliminary data from a study aimed at sourcing a Neanderthal flint assemblage from stratigraphic unit VIII of El Salt (Alcoi, Alacant, eastern Iberia) using siliceous raw material analysis. We interpret different provisioning environments based on geogenic features and, especially, postgenetic alterations, which are informative of primary, subprimary and secondary sources of distinct flint types. Then, we propose hypothetical catchment areas in which those environments could have existed in the region during the period represented by the Neanderthal occupations. Preliminary results point to short-distance catchment strategies and preference for fluvial and low-altitude deposits. Comparisons with chronologically contemporaneous and more recent stratigraphic units (i.e. IVb of El Pastor (Alcoi, Alacant, eastern Iberia) and Xa of El Salt, respectively) are made in order to reflect on the variability of Neanderthal regional resourcing dynamics through time.

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Mots-Clés: Neanderthal, Middle Palaeolithic, Iberia, hunter, gatherer mobility, siliceous raw materials

SG: PALEOLITHIQUE SUPERIEUR & MESOLITHIQUE

Early Aurignacian in western Asia, application of techno-technology and chronological frameworks for a comparison study between Iranian and Levantine sites.

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The importance of the transitional period is related to the disappearance of Neanderthals and the emergence of Modern Humans.
Near East provide unique stone assemblages of transition (middle to upper Paleolithic) remains for the origin of modern humans. The Iranian Zagros region is one of the most important candidates for the replacement of Neanderthals by *Homo sapiens*.

This article intends to study some transitional sites in the Zagros Mountains and the Levant. This research will address to appearance process and tool continuing, the similarities and differences between the stone tools in the transitional period in the mentioned areas.

The Zagros Mountains with a large number of Paleolithic sites is a critical area for the arrival of modern humans out of Africa. Transitional sites in the Zagros Mountains such as Warwasi rockshelter, Kaldar Cave, Eshcaft e Gavi, Yafteh Cave, and Ghar-e- Boof. Aurignacian period with Early Upper Paleolithic characteristics has the oldest reported date of 54,000 cal BP from the Kaldar site. Kaldar Cave (Layer 5) includes Mousterian and Levallois assemblage, the Upper Palaeolithic artifacts of Layer 4 conclude blades and bladelets. Modern Humans remains from Kaldar Cave and Eshcaft e Gavi from deepest Upper Paleolithic levels Show initial Homo sapiens occupation in the Zagros Mountains. In the Levant, Initial upper Palaeolithic, Ahmarian culture, began 42-46 ka ago, identifies in Kasar Akil while Aurignacian period of this site dates to ca. 39-33 ka cal BP.

Stone tools may take an account as cultural indicators that could be used to recognize cultural groups. Similarities of stone collections show that their sings belong to the same culture. In verse, differences of stone tools mark different cultures. Transitional stone types are found

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almost everywhere, however, in transitional periods some types are only limited to a specific geographic area. Some important transition assemblages in Zagros include: 1) Blade; 2) Bladelet; 3) Laminer flakes (blades length twice as long as width); 4) Core reduction (Middle Paleolithic); 5) Flake; 6) Side scraper; 7) Carinated end scraper; 8) Carnater burins; 9) Font-Yves; 10) Dufour bladelet; 11) Truncated facetted. Some of these tools are also common in the Levantine transition. However, there are also differences of tools in these two areas which will be discussed in the article.

This study attempt to provide more insights in understanding the culture and human behavior during the transition period in Near East considering chronological and lithic techno-typological comparisons.

Mots-Clés: Transition, Middle to Upper Paleolithic, western Asia, the Zagros Mountains, levant.

The role of the migrations in the Initial Upper Palaeolithic formation in Western Transbaikal (South Siberia)

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We can define two main contrary approaches to the origin of the Initial Upper Palaeolithic (IUP) blade industry in Transbaikal (South Siberia), which represented by tolbaga culture. These are the local formation on the base of Middle Palaeolithic (MP) (Lbova, 2005; Konstantinov, 1994) and in the result of the migrations from the adjacent territories (Rybin, 2009). Resolving this question, we should understand the degree of the tolbaga culture technological distinctiveness comparing with IUP industries in neighboring regions and its relation with the local cultures of the previous period.
Tolbaga culture is characterized by the predominant production of large blades and tools on them with using bidirectional knapping from subprismatic and flat cores in the primary knapping; toolkit conjoins Upper and Middle Palaeolithic tool types. Foliate bifaces are absent. Among specifical modes of tools' shaping, we should note the use of ventral/bifacial trimming at tools basal part and forming small tangs. All sites of the tolbaga culture present bone tools, non-utilitarian items, and complicated organization of the inhabited area displayed dwellings' remains, hearths, areas of tool production, middens and others defined in the cultural horizons. The tolbaga culture sites are dated back to the period of 47 – 27-26 kya (calibrated) (Konstantinov, 1994; Lbova, 2000; Tashak, 2011; 2014; Buvit et al. 2016).

MP at the Transbaikal territory is not enough investigated. Not numerous materials from the dated horizons (Khotyk, levels 5 and 6) do not allow characterizing specific traits of the Transbaikal MP in detail. Numerous materials of MP-appearance from the surface scatters do not give us a precise chronological position. The relationship with the local MP-assemblages is not obvious. However, some authors (Lbova, 2005; Konstantinov, 1994) propose the IUP origin on the base of MP.

Materials of the IUP sites from Transbaikal are considerably similar to those from Altai and Mongolia. At the same time, Transbaikal IUP materials stand out among the industries of adjacent territories for the seldom using knapping from the narrow end for getting blanks and also for the absence of bifaces, which are considered as one of the characteristic features for IUP industries of Altai and Mongolia.

We can observe similarities between the tolbaga culture and far-distant IUP industries of Lebanon.

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We identify in tolbaga culture materials not only general technological traits marking all IUP industries (Kuhn, Zwyns, 2009) but also some specific characteristics for the Boker-Tachtit industry (Rose, Marks 2014). These traits are: bipolar knapping with using crests, which, to Meignen (2012) opinion, is not common for the Lebanon IUP; Transbaikal points with bifacial trimming resemble Emireh points; the mode of the tang shaping at some tolbaga culture tools is similar to the "additional" characteristic of the Emiran (Rose, Marks 2014) – right lateral/bilateral nibbling at the base of Levallois points.

Hence, we suppose considerable influence of the migrations at the tolbaga industry origin in Western Transbaikalia. Penetrations of migrants at this territory were earlier 45 kya, likely at the end of Middle Palaeolithic from the Near East.

Mots-Clés: Initial Upper Palaeolithic, blade production, migrations, Transbaikal

Geographical variability and commonality in the development of bladelet technology in the Levant: implications for coast-inland relations in the Initial–Early Upper Paleolithic

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This paper discusses late Pleistocene social relations between core and periphery areas in the Levant by reviewing archaeological records regarding cultural changes from the Initial Upper Paleolithic (IUP) to the Early Upper Paleolithic (EUP) period. For this purpose, I will present an overview of current datasets and several unresolved issues regarding the geographical variability and commonality in the development of bladelet technology in the Levant. As a common general trend, bladelet production increased in the Levant from the IUP to EUP in association with technological changes for platform preparation, i.e., more frequent employment of overhang removals that create small striking platforms of blanks, typically punctiform and linear types. However, geographical variability is indicated by several records that include 1) early radiocarbon dates for the Ahmarian deposits in the coastal area, i.e., Kebara and Manot Caves, 2) late dates for some IUP assemblages in the inland zone, i.e., Wadi Aghar Layer B, Umm el Tlel, and Jerf Ajla, and 3) different trajectories of lithic technological changes between the coastal and inland areas, represented by the northern and southern Ahmarian variations. While the validity of these records needs to be checked further, they can be used to discuss possible scenarios for the core-periphery relations in the IUP–EUP Levant.

The currently available data indicate both social interactions and separations of groups inhabiting the coastal and inland zones in the Levant. The social distance between the groups is suggested by 1) differences in core reduction technology represented by the northern and southern Ahmarian variations, 2) possibly different timings in the emergence of bladelet technology between the coastal and inland zones, and 3) the endurance of the IUP technology in the inland zone. On the other hand, widespread adoptions of basic techno-morphological ideas about bladelets are likely to have resulted from social interactions among groups inhabiting different areas in the Levant. This is also supported by evidence for long-distance distributions of sea shells in the IUP and EUP. Collectively, I propose a working hypothesis that bladelet technology emerged earlier in the coastal zone, and it was subsequently adopted by the groups inhabiting the inland zone through social interactions. This took place following the technological tradition of the inland groups, and some of the inland groups may have retained the IUP technology.

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Mots-Clés: Levant, Upper Paleolithic, Lithic technology, Bladelet

Bladelet production in the Initial Upper Paleolithic in the Levant: examination of bladelet frequency, technology, and raw material economy

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Carinated technology and bladelet production characterize lithic assembalges of the Early Upper Paleolithic (EUP, including the Ahmarian and the Levantine Aurignacian) in the Levant. However, we know little about how these technologies emerged and became widespread in the Levant. The Ahmarian technology is generally considered to have originated from the preceding Initial Upper Paleolithic (IUP) on the basis of techno-typological continuity represented by Upper Paleolithic tool types (e.g., end-scrapers and burins) and prismatic core technology for blade production. On the other hand, there are yet few studies about bladelet technology in the Levantine IUP and its relevance to the EUP bladelet technology.
In this presentation, I will first present quantitative data showing the increase of bladelets from the IUP to the EUP by using the data sets of frequencies and dimensions of blade/lets from ca. 20 assembalges in the Levant. Sevaral Middle Paleolithic assembalges will also be used for comparision to characterize the bladelet occurrences in the IUP. I will then examine more specific technological characteristics for bladelet production in the IUP by presenting several bladelet cores-on-flakes that includes examples called 'burin-cores'. Because EUP bladelet cores (whether carinated pieces or narrow fronted cores) are often made on flake blanks, it would be reasonable to hypothesize that the IUP bladelet cores-on-flakes represent one of technological predecessors of the fully fledged bladelet technology in the EUP.

Finally, I will discuss changes in mobility patterns since the late MP to the UP as possible conditions, in which miniaturization of blade blanks became beneficial. The employment of bladelet technology is likely to have facilitated the transportability of tools/blanks and the efficient consumption of raw material, which were implemented flexibly in response to variable conditions of raw material availability, mobility, and provisioning strategies.

Mots-Clés: Levant, Upper Paleolithic, Lithic technology, Bladelet

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PEUPLEMENT CAPSIEN DANS LA REGION DE MILA (EST ALGERIEN) : NOUVELLES RECHERCHES ET DECOUVERTES.

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Les recherches sur le capsien dans la région de Mila (Est Algérien) ont été focalisées durant une longue période sur l'escargotière de Mechta-el-Arbi, découverte au début du XXe siècle. Ce site a fait l'objet de plusieurs campagnes de fouilles qui ont révélé son potentiel archéologique important. D'autres sites ont été signalés dans les environs de Mechta-el-Arbi, tels que Brana, Tadjenanet (Saint-Donat) et Mechira mais les études consacrées à ces sites ont été insuffisantes. De récentes prospections ont été menées dans la région de Mila à partir de 2017, ont permis la découverte de 49 sites capsiens inédits (principalement des escargotières) dans le sud des hautes plaines constantinoises, notamment dans la région de Chelghoum El-Aid, Mechira, Tedjenanet, Ouled khlouf et Telaghma.L'objectif de cette intervention est de montrer l'importance de l'occupation capsienne, et de présenter les résultats des prospections effectuées dans cette région.

Mots-Clés: Mila, Capsien, Prospections, Mechta, el, Arbi, Escargotières

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Geometric microliths as a cultural marker in western Central Asia

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Geometric microliths are one of the main cultural and chronological markers typical for Central Asian Stone age archaeology. The earliest geometric microliths in the region are represented by scalene triangles in Kulbulakian complexes (31–21 kaBP) [Kolobova et al., 2019]. The geometric tools subsequently shift from rectangular (20–15 kaBP) to lunate forms (15–9 kaBP) [Shnaider et al., 2020]. Lunates are one of the defining attributes for toolsets of the Eastern Caspian Mesolithic complexes, replaced by scalene triangles and symmetric trapezoids during the Neolithic [Alisher kyzy et al., 2020]. The Central Asian Neolithic is characterized by the abundance of diverse trapezoids: symmetric trapezoids on microblades (Oyukly culture and early Holocene complexes mountainous part of the Central Asia) [Markov, 1971], symmetrical, shortened, and elongated trapezoids on blades (Jeytun culture) [Masson, 1971], and horned trapezoids (Kelteminar culture) [Vinogradov, 1981; Szymczak, Khudjanazarov, 2006*]. The following chronological sequence of the shape variability of geometric microliths was traced in Central Asia: scalene triangles – rectangles – lunates – trapezoids. The shape of geometric microliths can be considered as a chronological marker, and the shape of trapezoids serves as a cultural proxy in Neolithic complexes. A correlation between the types of geometric microliths and the splitting technique typical for a particular industry can be observed. Scalene triangles, rectangles, and lunates are identified in complexes with percussion blade/bladelet industries (Kulbulakian, Tutkaulian, Mesolithic and Neolithic of Eastern Caspian), while trapezoids are widely common in pressure blade/bladelet assemblages (Jeytun, Kelteminar, Oyukly and Hissar cultures, complexes of the Fergana and Naryn valleys).*

Mots-Clés: Central Asia, geometric microlith, knapping technology, culture

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Spatial distribution of raw material types at the Paleolithic sites: a case study from the northern Mongolia

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The Middle Selenga River Basin, the main tributary of the lake Baikal, is an area representing the example of the definitive role of raw material outcrops in the Paleolithic sites location. Dozens of the sites are situated in the area of Permian formation, included the Tulbur thickness with stone raw material outcrops in the Ikh Tulberiin Gol and Kharganyn Gol Valleys. This raw material is distinctive in composition and quality in terms of knapping. Nine types of cherts (silica-rich rocks), three types of coarse tuff and tuffites with siliceous cement and one type of tuffaceous siltstone are divisible in the results of petrochemical analyses (Rybin et al, 2016).
Types of raw material that ancient humans utilized, producing artifacts, have been included to the comparative collection and counted as an attribute for each artifact in the course of technical typological analysis. This gives an opportunity to study spatial distribution of raw material types and raise a question about the principles of selection and use of material within a site.

Tolbor-21 (T-21) and Kharganyn-Gol-5 (KhG-5) are the stratified multilayered sites. Terminal Middle Paleolithic is presented here by archaeological horizons 7 and 6 of KhG-5, and Initial Upper Paleolithic is presented in the horizon 5 of KhG-5 and horizons 5 and 4 of T-21 (Khatsenovich, 2018; Rybin, 2020). Raw material primary outcrops were located in 200-400 m from the sites. Local raw material was predominantly used by humans during their occupation of the river valleys. The only exception is KhG-5: here the ratio of local and transported raw material significantly changed from the Middle to Upper Paleolithic (Khatsenovich, 2017). This site is located at the periphery of Tulbur formation, and geochemical modules indicated that raw material was transported from the neighboring valley. Necessity of raw material transportation and small size of the blocks at the local outcrops affected the artifact size (Rybin et al, 2016).

Spatial distribution of raw material types at these sites was studied in the horizons 7 - 6 of KhG-5 and horizon 4 of T-21 using kernel density estimation (Baxter et al., 1997). Particular types of raw material are located in the particular areas. Supposedly it reflects behavioral aspects related to raw material selection or usage of the one available nodule. Type 4 (fine cryptocrystalline chert), located in excavation Pit 2 of the T-21 site and almost absent in other excavation pits, is an example of such a situation.

Further, the raw material impact on morphology was studied. For this purpose the length

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and width parameters of the blanks (flakes and blades), made from one raw material have been compared to each other within one horizon.

Both sites indicate the highest percent of the most easily accessible and widely available type 1. On KhG-5 however the other types have relatively large percent and it spatial distribution is more homogeneous. This may be due to the greater distance of this site from raw material outcrop.

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Mots-Clés: spatial analysis, northern Mongolia, raw material, kernel density estimation

Final Pleistocene – Early Holocene complexes in the Eastern Caspian region.

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During the Final Pleistocene-Early Holocene, the Eastern Caspian played an important role by being at the interfaces of multiple cultural territories and ecological niches. The Mesolithic assemblages from the region were attributed to the Trialetian complex by S.K. Kozlowski [1996], and later analyses supported this attribution [Brunet, 1999, Shnaider, 2015]. However the recent archaeological advances in Central Asia have brought new insights into the cultural diversities of this specific period of the human history. Thus, we propose in this paper to reinvestigate the question of the Eastern Caspian Mesolithic attribution in light of the new knowledge recently acquired by collection recoveries. In this aims, we present our analyses of the lithic assemblages from the multilayer key sites of Eastern Caspian – Dam-Dam-Cheshme 1 &2. The lithic assemblages are characterised by the high frequency of blade/lets, geometric microliths (lunates, scalene triangles and trapezoids), backed pieces, notches/denticulates, scrapers, especially end scrapers. They show both strong technological and typological similarity with the contemporaneous Southern Caspian assemblages (Hotu, Kamarband, Ali-Tepe and Komishan), which were developed in the same environmental context [Jayez, Nasab 2014]. At the same time, some similarities on toolset (evolution of the shape variability of geometric microliths and metric characteristics) might be found with materials from Final Pleistocene- Early Holocene sites of Western Central Asia (Tutkaulian)[Shnaider et al. 2020]. However, our analysis identify differences with assemblages attributed to Trialetian industries (Chokh, Edzani and Hallan Çemi).
Thus, it seems that the Eastern-Southern Caspian macro region might have formed a cultural entity during the Final Pleistocene and Early Holocene, separated from the Trialetian culture. At the same time, during this period Caspian people might have maintained cultural interaction with the Tutkaulian population from the inner Central Asian territories.

Mots-Clés: Early Holocene, Eastern Caspian, lithic assemblage, Mesolithic

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Bladelet production in the Initial vs. Early Upper Paleolithic assemblages of Central Asia

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A distinctive bidirectional subprismatic method of reduction may be reconstructed for the Initial Upper Paleolithic (IUP) of Southern Siberia and eastern part of Central Asia. This method, associated with the concept of maintaining subtriangular asymmetric volume of cores, was aimed at production of laminar blanks and resulted in large and medium-sized blades used for retouched tools production. The reconstruction of reduction technology at the Kara Bom site (the Russian Altai) has revealed that production of small laminar blanks was embedded into this method since the earliest stage of the IUP ca. 48,000 – 50,000 BP (Zwyns et al., 2011). A distinctive feature of the IUP technology in Southern Siberia and eastern part of Central Asia was exceptionally rare intentional retouching of bladelets, including backed ones. Bladelets were produced following specific reduction method using burin-cores made on thick side-blades. In the other regions of IUP distribution, for example, in Northern Mongolia, bladelets were obtained using several independent methods, such as production from small blocks of raw material, or intentionally fragmented blanks. The evidence from the Tolbor-4 site (ca 40,000–45,000 BP) indicates that. The carinated technology is represented by rare thick end-scrapers; it played a marginal role in the technological program of the IUP as opposed to the later assemblages of the Early Upper Paleolithic in the Altai (the Ust-Karakol-1 site) where it is manifested by serial and typical cores. The carinated technology played a very important role in the western part of Central Asia in the industries of the Early Upper Paleolithic Kulbulakian tradition from the Kulbulak site (layer 2.1, ca. 35,000 BP) (Uzbekistan) and Shugnou site (layer 1, ca.31,000–32,000 BP) (Tadjikistan), where the number of the carinated cores reached 53%, and such cores represented an independent technological trend. Morphology of the small-blade elements of these technocomplexes will be compared for establishing a possible boundary between the carinated technology and methods of bladelet production in the IUP.
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Mots-Clés: Central Asia, Siberia, Upper Paleolithic, lithic technology, bladelet production

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Carinated technology in the Upper Palaeolithic of eastern Eurasia: chronology and technological evaluation

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It is well known that western Eurasia has a long history of research on carinated technology in the Upper Palaeolithic, in terms of typological, technological, and functional perspectives. On the other hand, in recent years, due to the relationship with the emergence of the pressure microblade technology, much attention has also been focused on the sporadic distribution of carinated technology before and around the Last Glacial Maximum in eastern Eurasia. In the lithic assemblages before and around the Last Glacial Maximum in Siberia, Mongolia, northern China, the Korean Peninsula, and the Japanese archipelago, microblades or bladelets were produced not only from prismatic and narrowed prismatic cores but also carinated cores. Although information is still scarce, notable data has been obtained on the chronological positions and technological features of lithic assemblages including carinated technology in eastern Eurasia. To understand the population dynamics and cultural transmission across a wide area during the Early and Middle Upper Palaeolithic of Eurasia, a comprehensive comparison and evaluation of them from the technological and behavioural perspectives needs to be undertaken. In this paper, I first assess the problem of the definition of microblades and bladelets in the study of the Early and Middle Upper Palaeolithic of eastern Eurasia. Second, I present the technological variability of microblade/bladelet technology including carinated cores and the chronological framework in the Early and Middle Upper Palaeolithic in Siberia, Mongolia, northern China, the Korean Peninsula, and the Japanese archipelago. Third, I discuss the relationship between the carinated technology and the emergence of the pressure microblade technology.

Mots-Clés: carinated technology, microblade, bladelet

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Similar technical solutions, different shapes: a focus on armatures production from Riparo Tagliente (VR, Italy) and Troubat (Hautes-Pyrénées, France)

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Lithic armatures are among the elements with the highest morphological variability in Late Palaeolithic techno-complexes. As suggested by several ethnographic studies, this seems to be related to two main factors: the hunting techniques and their role as markers of ethnic and personal identities. For this reason, they have often been used as key elements to identify distinct socio-cultural traditions through time and space. Increasing our knowledge on these instruments, which for many decades have been analysed through a mere typological approach, might allow highlighting similarities and divergences across a specific territory in a diachronic and spatial perspective.
In order to face this issue, we present a comparison between the armature assemblages from layers dated to the Late Glacial of two Southern European sites. Riparo Tagliente (VR, Italy) covers the span between the last part of GS-2 and the first half of GI-l (from 17,219-16,687 cal BP to 14,535-13,472 cal BP) while the sequence of Troubat (Hautes Pyrénées, Fr) is dated between the last part of GS-2 (17,770-16,981 cal BP) and the GS-1 (12,115-11,766 cal BP). Thanks to a morpho-scopic analysis focused on blanks selection, backing methods and retouch techniques it was possible to identify several analogies and differences between these sites. If on one side armatures are clearly different from a morpho-typological viewpoint, the technical solutions adopted to produce them show some similarities during the time span analysed, i.e. between the Late Epigravettian sequence of Riparo Tagliente and the Middle-Upper Magdalenian-Late Azilian sequence of Troubat.

Mots-Clés: Backed points production, Late Glacial, Riparo Tagliente (VR, Italy), Troubat (Hautes Pyrénées, France)

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Rethinking the Late Paleolithic of Bohemia: A Compartive Perspective on Lithic Material Selection and Transport

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Understanding changes within Pleistocene hunter-gatherer communities can be difficult, and the economy of raw material transport is often the best means through which this can be observed. This is the case throughout the prehistory of Central Europe, and particularly in Bohemia where there is a lack of high quality lithic material. In some periods, raw material was important from distant sources; other periods are marked by a shift to lower quality local sources. In this paper, we focus on the Late Paleolithic, and analyze the composition of raw material types represented in published assemblages. Comparing observed patterns to preceeding and consecutive periods provides insight on shifts in mobility and production strategies. During the Upper Paleolithic, longer blade propduction required the import of high quality materials. During the Mesolithic, production of microliths was dominated by locally available material. We shall demonstrate that the Late Paleolithic, which lasted about 2000 years, marked a very different pattern altogether, and will track the origins of this shift. Late Palaeolithic raw material use is generally characterised by combination of Upper Palaeolithic and Mesolithic composition. Focus on the well dated collections should help us to pinpoint the spot, when this change appeared. The paucity of C14 dates associated with the Late Paleolithic of Bohemia, we argue, has suppressed understandings important changes in regional interaction and local production practices. Tracing shifts in material choices, as a result, may be an important starting point to new understandings of developmental trajectories immediately prior to the Holocene.

Mots-Clés: Late Palaeolithics, Raw material sourcing, Central Europe, Bohemia, Longue Durée

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The bladelet production in the Early Upper Palaeolithic assemblage of the Ust-Karakol-1 site (Russian Altai)

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Assemblages of the Ust-Karakolian cultural tradition appear in Southern Siberia about 35–33 ka uncal BP and reflect a regional variant of the Early Upper Palaeolithic. Mobile groups of hunter-gatherers represented this population; in technological terms, this tradition had many parallels with the Aurignacian in Europe and the Middle East. Here we present new data on the technology of bladelet production from the Ust-Karakol-1 site in Russian Altai. Our research focused on the production sequences and functions of artefacts following technological, experimental and petrographic methods, 3D-modeling. An integrated approach helps determine the role of the discussed technology in economic activities and identify some cultural and behavioural stereotypes of the Early Upper Palaeolithic inhabitants of Altai.
The lithic assemblage of Ust-Karakol-1 is based on the blade production technology using volumetric parallel unidirectional reduction. The primary trend in this complex was the production of miniature and narrow bladelets from edge-faceted and wide-frontal volumetric cores. The toolkit of Ust-Karakol-1 includes backed bladelets, carinated end-scrapers, ogival end-scrapers, massive side-scrapers. A specific feature of the Ust-Karakolian assemblages of Altai was personal ornaments made of serpentine, teeth of hoofed mammals and shells of freshwater molluscs.

The petrographic study shows that the raw materials for the bladelet production were high-quality nodules and flakes from hornfels pebbles, dense weakly-hornfelsed sedimentary rocks, thinly crystallized aphyric effusives, and homogeneous siltstones, as well as jaspers, wax jasperoids, and rock crystal, which are lithic raw materials of the highest quality in terms of technology. The results of the technological analysis showed that the preparation of the core's preform was minimal or complex. In the latter case, the master gave the item the shape of an elongated trihedral prism, while the front was located at the core's end, and the section of the preform provided it with the necessary triangular shape. The shortened front acquired a convex shape and arcuate profile during the reduction of the cores by the unidirectional method, and the products acquired a carinated morphology. In this group, we revealed a series of expressive intensely worked cores of the specific bifrontal modification.

Depending on the utilization strategy and the degree of reduction, blanks with a straight or curved profile were produced. The bladelets are significantly differentiated from the blades by

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the size of the residual butt; the proportion of the proximal oval zones is much higher among the bladelets. We recorded the traces of reduction and abrasive preparation on the residual buts of bladelets and cores for their production in Ust-Karakol-1 assemblage. According to the results of experimental modelling, the reconstructed reduction sequences could be implemented on local raw materials using a soft organic hummer or an intermediate tool.

This research was funded by the Russian Science Foundation project No 20-78-10125 "The dynamics of cultural development and human colonization of Altai at the onset of the Upper Paleolithic: life support strategies, paleotechnologies, mobility".

Mots-Clés: Altai Mountains, Ust, Karakol, Early Upper Paleolithic, lithic raw material, technological analysis, bladelet production, carinated cores

New data from old excavations: revising the Initial Upper Paleolithic complex of Arembovsky site (Cis-Baikal)

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Many research interests are currently focused on the Initial Upper Paleolithic (IUP) complexes of Central Asia because of their key position in such research questions as the origin of modern behaviour, migrations of ancient human populations and species of these populations. The age of the complexes has a wide range from 50 to 28 kyr BP. Arembovsky site is located in the north-eastern part of Irkutsk city. The estimated age of the site was evaluated within 35–25 kyr BP. During our revising the Arembovsky site collection, several important features were discovered that weren't previously known - the composition of the lithic industry was clarified, and faunal remains were revealed. The collection of archaeological material contains 15 423 pcs. The main lithic raw material of the industry is argillite. Lithic production was aimed at the large laminar blank production using the uni- and bidirectional reduction of flat-faced and sub-volumetric cores. Numerous core-trimming elements (crested and semi-crested blades) and the high value of the Ilam (29.7) show the congruence with the core series. The evidence of the Levallois technology is sporadic and presented in the collection with four Levallois cores for flakes. Meagre formal tool-set (64 pieces) based on the laminar blanks generally consists of end-scrapers, side-scrapers, oblique points, elongated points and various retouched blades. These types characterize the regional Upper Paleolithic industries in general, but their combination with described core reduction strategies is an explicit signature of the IUP industries of Central Asia. The assemblage of the lithic material types (a large number of lithic production debris, a minimal amount of completed tools) and proximity of raw material source show that Arembovsky site was a workshop. A small amount of faunal remains confirms this functional specification also. The faunal remains include 113 fragments of bones and antlers. The identified fragments belong to *Mammuthus sp.*, *Equus sp.*, *Bos/Bison sp.*, *Rangifer tarandus.* Bones allow yielding AMS dates that confirm the Upper Karginian age, suggested by first researchers and narrow down the chronological range. The retoucher was identified among faunal remains also. This tool is a pointed semi-oval cross-section fragment of a reindeer antler with dimensions of 109x30x10mm. The generalized macro-trace characteristics of the artefact indicate that the fragment of the reindeer antler was cut until a spongy mass and break off. This kind of tools is common for Siberian Paleolithic - e.g. bone retouchers with similar shape are present in materials of Malaya Syiya, the IUP site in Kuznetsk Alatau. Currently, Arembovsky site is the youngest IUP complex in the vast territory of the eastern part of Southern Siberia. There aren't known indisputable older complexes in Cis-Baikal, the technological approaches of which could be interpreted as ancestral to Arembovsky materials. Set of cultural markers distinguished

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by E.P. Rybin for IUP complexes of Central Asia has minimal occurrences at Arembovsky site (bidirectional core reduction for blades, oblique points on blades). These features together with relatively young age and geographic isolation make more obvious a hypothesis that technological approaches in lithic production spread from Trans-Baikal.

Mots-Clés: Southern Siberia, Cis, Baikal, Initial Upper Paleolithic, lithic production, bone industry

Multiproxy studies of Lateglacial sites from Western Poland

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The Third Science Revolution enabled the application of sophisticated methods such as DNA, ZOOMs, stable isotope measurements, mathematical modelling, etc. to detailed recognition of human behaviour, subsistence strategies, seasonality in a high resolution. The possibility of using these methods requires some favourable conditions for preserving organic materials, i.e. antler, bones, wood, residues, seeds or charcoal. While, most of the Lateglacial sites from the North European Plain are located on sandy, acid soils. In such conditions, organic materials occurred rarely.
The paper aims to demonstrate the detailed reconstruction of daily life at Late Palaeolithic camps, based mainly on palaeobiological analyses of remains obtained from the natural archives, such as palaeolakes. These results were accompanied by geomorphological and geochemical studies. Moreover, for recognition of the camp's structures, statistical methods were used. The intra-site analyses were also enriched by functional studies of lithics. The application of the wide set of methods allows us to look a bit closer to the Late Palaeolithic communities, but still, some crucial questions remain unanswered.

We would like to discuss how far we are in learning about the Late Glacial communities and how much have we changed the knowledge of our scientific fathers.

Mots-Clés: Late Glacial, Environmental conditions, natural archives, lithic studies, statistical methods

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Grotta di Pozzo (central Italy) and the human peopling of the Apennine mountain range from the LGM to the early Holocene

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Grotta di Pozzo, at 710m asl and 42∘N, is a small cave in the central Apennines of Italy, opening at the southern edge of a basin of tectonic origin, surrounded by mountains reaching 1700-1800m asl and more. A shallow lake, lake Fucino, developed in the basin during most of the Upper Pleistocene, extending over 150 km2 in historic times before land reclamation.
Excavations were aimed at investigating the timing and mode of recolonisation of the central Apennines since the LGM. At the base of the deposit, fluvio-lacustrine pebbles and clays were deposited at the LGM during a high stand of the lake. The archaeological sequence starts on top of them at 23ka cal BP, with layers including lithic industry of the Early Epigravettian with shouldered points. After 16 ka cal BP, and up to 14.5 ka cal BP, the lithics belong to the Late Epigravettian. Chamois, accompanied by ibex and red deer, dominates the fauna, while substantial fish (*Salmo trutta*) exploitation also occurs in the uppermost Lateglacial layers. Marmot and black grouse were both predated.

Wall art, including bas-relief vulvas and a Gönnersdorf silhouette, is related to the Late Epigravettian occupation.

During the Holocene, between 10.5 and 9 ka cal BP, a shell midden (*Helix delpretiana*) accumulated, with lithic industry belonging to the Sauveterrian.

All over the Lateglacial and Holocene sequence, hearth deposits and cooking structures are well documented. Middle- to long-distance contacts are evidenced by the use of lithic raw materials not available locally and by marine shells.

Mots-Clés: Grotta di Pozzo, Apennine mountain, early Holocene

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Nouvelles données sur le Paléolithique de Bassin de Minoussinsk, Sibérie du Sud (Le site d'Irba 2)

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Le présent rapport vise a présenter les résultats des travaux de sauvetage dans la région de Krasnoiarsk realisés au cours des travaux sur un chemin de fer en construction Kyzyl - Kouragino en 2012 et 2015. L'étude du site à plusieurs couches Irba 2 a mis en évidence des vestiges archéologiques attribués à la période du Pléistocène, dèposèes au-dessous du niveau des couches litèes holocènes. La macrofaune est majoritairement représentée par les restes de bison ainsi que par des ossements de cerf élaphe et de renne, de cheval, d'ours brun et de lièvre du Don. Il est curieux de noter la présence d'un fragment de bois attribué au grand cerf, probablement au *Megaloceros giganteus*. L'âge estimé obtenu par les datations 14C place ces découvertes au Pléistocène final (environ entre 13 et 11 Ka). Les vestiges paléolithiques dans leur dispersion ont été représentés par des zones de concentrations de pièces lithiques taillées et des restes osseux, qui étaient de forme ronde-ovalaire et séparés par des espaces vides. La représentation planimétrique de ce type forme présente un contraste frappant avec des gisements déjà connus attribués à la phase finale du Paléolithique, situés dans la vallée de l'Iénisséï. Si ces derniers sont généralement liés à la stratigraphie représentée par des couches alluviales fines des terrasses basses au-dessus du lit majeur, ceux-ci sont similaires par leur structure aux sites magdaléniens du bassin Parisien (Vasil'ev 1994), mais le site d'Irba 2 est plus proche des gisements à Federmesser de type Closeau (Bodu 2010). L'industrie lithique du gisement correspond aux caractéristiques des ensembles de sites attribués à la culture Afontova qui prédomine sur le territoire du bassin de l'Iénisséï à la période de Sartan final. Une attention particulière est accordée au site Irba 2 grâce à une rare découverte : un galet de forme ovalaire plate en marbre blanc avec 37 stries conservées sur son bord, et des gravures en croix sur les deux faces et des traces de perçages non terminés. Les découvertes similaires les plus proches (il s'agit des disques gravés en agalmatolithe) de celle du

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site Irba 2 sont issues des fouilles anciennes des sites Afontova Gora II et III à Krasnoiarsk. De tels objets sont rares au Paléolithique et ils correspondent probablement des amulettes.

Mots-Clés: Sibérie, Paléolithique final, culture d'Afontova, art mobilier, galet gravé

SG: NEOLITHIQUE

Il y a 5000 ans, le Bâtiment des Vaux (Moulins sur Céphons, Indre, France), incendie accidentel ou volontaire ?

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Hamon Tony, Rodot Marie Angélique
Le Bâtiment des Vaux est une construction réalisée sur poteaux plantée datée d'environ 5000 ans. La fouille programmée réalisée 1998 à 2011 a démontré qu'il s'agissait d'un bâtiment domestique à usage collectif de 20 m de largeur maximum, pour une longueur estimée approchant les 140 m. Ce serait une construction réalisée par des primo arrivants de la culture d'Artenac qui se développait en Saintonge, soit environ à une centaine de kilomètres du site fouillé. Le gisement est constitué de vastes palissades qui forment un plan en éventail ouvert, le bâtiment se trouvant en lieu et place de la poignée, le tout sur une superficie de près de 6 hectares. Tout le gisement, bâtiment compris à entièrement brûlé, ce qui a probablement déclenché l'abandon du site. A l'occasion de ce colloque, nous souhaiterions présenter dans la session 291324, ce gisement qui comporte un bâtiment monumental de type Antran et nous questionner sur l'origine de l'incendie qui a ravagé le site, sachant que tous les bâtiments type Antran fouillés ont brûlé (Figure).

Mots-Clés: Bâtiment, domestique, Néolithique, incendie

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Sickles in transition: a case study from Bulgaria

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Abstract: This paper focuses on the well-documented evidence of sickle use and variability in Bulgarian prehistory, from the Early Neolithic, represented by the distinctive 'Karanovo type' sickle, through the Chalcolithic, when continuous exhaustive use of the same type of composite sickle is attested but with more standardised flint inserts, and into the Early Bronze Age (IV mill. BC) when denticulates with cereal polishes appeared and became both a characteristic feature of the flint industry and the most common harvesting tool.
In diachronic and evolutionary perspective changes are evident in the stylistic characteristics of sickles (handle, insertion system, mode and kinematics of use), as well as in the raw materials used for flint inserts and their techno-typological parameters. After two millennia of sickle stability (Neolithic, VI mill BC and Chalcolithic, V mill. BC) a crucial shift occurred at the beginning of the Bronze Age when the traditional sickles were first partially, and later entirely it seems, replaced by a new and distinctive type of flint tool: denticulated blades. During all periods of stability and transformation, the most persistent feature of sickle blades and inserts remains the recognizable cereal polish. A unique 'hoard' of sickles from the Late Neolithic is also discussed.

Mots-Clés: Neolithic, Chalcolithic, BE, sickles, inserts, cereal polish

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Biomolecular analysis of Neolithic pottery in the Mediterranean coast of the Iberian Peninsula (5300-3800 cal BC)

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In the early Neolithic period, a change occurred in the relationship between society and the environment, characterised by a transformation in the relations of management and exploitation of natural resources. Linked to the Neolithic origin, the appropriation and direct intervention on the reproductive rhythms of these resources show the scope of this new socioeconomic system. This fact not only marked a change in subsistence strategies, but also in the diet of the human groups involved in these changes.
The biomolecular and isotopic characterisation of the organic residues preserved in pottery provides essential information to approach the acquisition, production and consumption of products. The following work presents a synthesis of the results of different Neolithic sites located in the Mediterranean coast of the Iberian Peninsula obtained by gas chromatography, mass spectrometry and isotopic analysis of the lipids eventually preserved in ceramic vessels.

In a period as relevant in the evolution of food management as in the Neolithic period, the identification of meat products with a domestic and wild origin, dairy products and plant resources in different contexts of the Iberian Peninsula allows us to provide new data to the economy and the diet of the human groups that occupied the Iberian Peninsula more than 7000 years ago.

Mots-Clés: Lipids, Isotopes, Neolithic, Mediterranean, Pottery

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Mobility strategies and settlement systems in eastern Tandilia range during middle Holocene (Argentina)

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Southeastern America's Pampean región is a wide sector with an approximate size of 600,000 km^2 where numerous human occupations belonging to the middle Holocene have been recorded. For this period, a model characterized by an increase in residential mobility as a consequence of a demographic decrease was proposed, In this context, technological management was dominated by raw materials use from local and regional distances, while subsistences pattern was dominated by *specialized regional economies*, with emphasis on guanaco (*Lama guanicoe*) and pampas deer (*Ozotoceros bezoarticus*) consume and other continental and marine resources complemented.
This work deals with the study of 13 lithic assamblages corresponding to 10 sites excavated in caves and rockshelter of eastern Tandilia range, where through different research lines (technomorphological, geological and statistical analysis) mobility strategies and settlement systems developed during this period are interpreted. In this way results show that hunter-gatherer groups of these range, logistical mobility strategies developed, where caves and rockshelters were used as natural refuges during hunting and gathering expeditions. In this context, raw material technological management suggests that these human groups complemented curated strategies for good quality rocks from regional distances, together with opportunistic management strategies for local or immediately available rocks poorly quality. Finally, long-distance raw material are also identified that could have been the result of exchange processes, without ruling out a possible direct procurement during annual range mobility system.

Mots-Clés: Mobility strategies, settlement systems, hunter, gatherer, middle Hollocene, Southeastern America's Pampean región

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Diachronic raw material procurement along the al-Hajar Mountains in Abu Dhabi Emirate (UAE)

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The great majority of Palaeolithic findings in south Arabia appear as either isolated artefacts or surface find scatters. Contextual embedment is documented in few cases only. Beside by stratigraphy, context can also be provided by geological and geomorphological factors. Here, we report on the recent discovery of diachronic lithic raw material procurement and occupation in the Hafit-Mezyad area of Abu Dhabi Emirate in the United Arab Emirates. The main site, HTM0126, is located on the slopes and at the foot of a Late Cretaceous outcrop along the west edge of the al-Hajar Mountains with mainly conglomerates showing a high diversity of silicites. Traces of episodic occupation span from the Lower Palaeolithic to the Holocene. Beside raw material extraction and primary production, the site also provides evidence for the production of blanks and tools in a wide range of techno-complexes: Acheulian, Levallois, platform core-based blade production, as well as early to mid-Holocene flake industry and bifacial production. The chronology suggested by these technologies correlates with the degrees of weathering and patination of the artefacts. All techno-complexes also provide examples of 'domestic' tools. This finding is in agreement with the geomorphological position of the site, which has but a small catchment area for rainwater-runoff, and thus a very low degree of sedimentation dynamics. This led to the preservation of a palaeosurface with high-integrity find scatters where refittings allow for reconstruction of lithic workshops. Today, to the west of this palaeosurface, an extensive alluvial plain is covered by mid- to late Holocene gravels that accumulate in course of the rare but heavy rainfall events. In the early Holocene, however, just as in previous interglacials, higher precipitation must have fed extensive wetlands which potentially supported abundant wildlife.

Mots-Clés: raw material, diachronic use, Palaeolithic, Neolithic, south Arabia, geology, geomorphology

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Social differentiation in Neolithic communities in the Middle Nile Region

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Throughout the recent archaeological fieldwork in the Middle Nile Region (from the First Cataract to the Sixth Cataract where the White and Blue Nile connected) a better understanding of the past human life during Neolithic could be established. Based on the excavation results and archaeological research, especially in Neolithic cemeteries (e.g. R12, Kadruka, Al-Ghaba, Kadada and Kadero) researchers were able to study the funeral goods in burials, as well as some social and economic aspects in addition to the funeral practices of the Neolithic communities in the Middle Nile Region in Sudan and Egypt.
The current paper is an attempt to highlight the social differentiation in Neolithic communities in the Middle Nile Region based on the analysis of funeral goods (quantity, quality, and materials). Furthermore, to highlight the possible contact between these communities and others.

Mots-Clés: Neolithic Communities, Prehistoric Sudan, Neolithic Burials.

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La place sociale des enfants dans les sépultures néolithiques du Sahara central

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De nombreux sites étudiés au Sahara nigérien et libyen ont fourni de multiples informations sur l'aspect architectural, les modes funéraires et la chronologie de divers monuments. Mais l'intérêt porté aux interprétations archéologiques concernant les sépultures d'enfants est assez limité par rapport aux milliers de monuments funéraires à l'échelle du Sahara. Nous mettons particulièrement l'accent sur les résultats issus de l'étude globale de la nécropole à tumulus à couloir et enclos d'*Emi Lulu* 2 (Niger) et de sites dispersés de *l'Ahaggar* (Algérie).
Pour ce type de sépultures que nous pensions jusqu'a alors réservées aux sujets adultes de sexe masculin, la sépulture de *Tourghine* 2 (Tassili du *Fadnoun*, Algérie) change tout par rapport à ce que nous savions sur les pratiques funéraires. Elle a livré un immature en position hyper-fléchie, dans une fosse aigue, avec des parois aménagées et sans mobilier d'accompagnement.

Il est bien certain que ce cas isolé et cette documentation, malgré leur importance majeure, ne soient pas suffisants pour répondre complètement à nos interrogations, mais nous pouvons néanmoins avancer quelques hypothèses d'interprétation.

Les enfants disposaient d'un espace sépulcral isolé (du contexte d'habitat) qui leur est réservé et bénéficiaient des mêmes modes d'inhumation que les adultes tant dans la disposition soignée du corps que dans l'architecture funéraire (fosse aménagée, structure externe). Que témoigne cette catégorie de sépultures dans le paysage saharien, qu'il soit funéraire ou rupestre ? Représente-elle une classe socialement importante jusque dans la mort ? Faut-il distinguer l'enfant biologique de l'enfant culturel ? Autant de problématiques complexes que je vais tenter d'exposer dans cette contribution, dans l'optique d'une meilleure compréhension des traitements funéraires des enfants au Néolithique d'un point de vue culturel et social.

Mots-Clés: Sahara central, Niger, Monuments funéraire, Sépultures d'enfants, Peuplement holocène.

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Late-Pleistocene & Holocene Adaptation Strategies at Central India: with Special Reference to Chopanimando, Belan Valley

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The transitional phase between Pleistocene and Holocene played an important role in the history of mankind. This time earth and its genera were experiencing a huge environmental transform, which created a platform for settled form of life from the hunting-gathering stage. Therefore, a unique kind of subsistence could be recognized during this period. Unlike the previous phase, a tendency of controlling over the environment could be noticed in hominin behaviour which is marked by beginning of domestication of wild crops, hunting of small fauna (sometimes animal offspring), making of pottery and dwelling etc. Alike every other parts of the globe, Vindhya-Gangetic region experienced same kind of environmental and behavioural transformation and adopt with it. The present essay will focus on the adaptation strategies of this particular part of India with special reference of the site Chopanimando, during the late-Pleistocene & Holocene eon.

Chopanimando is situated in Belan Valley, which is a part of Vindhya-Gangetic complex. Geographically, Vindhya-Gangetic region is positioned at Central part of India and comprises parts of the states: Uttar-Pradesh, Madhya-Pradesh and some adjoining areas. Until-now, several sporadic Archaeological explorations and excavations were undertaken by different scholars in this region, resulted discovery of numerous Stone-Age sites and its continuous sequence starting from Late-Acheulian to Neolithic. Prof. H.D. Sankalia called this region, a unique example of having "Text Book" sequence of Stone-Age. However, the Stone-Age continuous-occupation at this region is a matter of debate, and amongst the most challenging-debates are summarized below.

- **Why** was such continuous Stone Age occupation in this region?
- **How** did the Stone Age hominin manage to survive for such long?
- **When** the region was occupied by different techno-cultural-groups? For how long had they survived?
- **Who** were the authors of these?

In spite of the previous-works, to solve these aforesaid problems and to understand such long and continuous occupation of Stone-Age hominin in this region, it is pertinent to focus on the evidence

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found so far in integrated manner. Keeping this concept in mind, in the present piece of work of mine, I have tried to understand the Stone-Age findings in totality of this particular region in the light of the first two problems ("Why"&"How") with special reference to the site Chopanimando.

Mots-Clés: Adaptation, Environment, Late, Pleistocene, Holocene, Central India

Paléoéconomie animalière des communautés Hamangia (5500-4700 BC)

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Des recherches archéologiques récentes conduites ces 10 dernières années sur la culture Hamangia ont apporté de nouvelles informations liées à la paléoéconomie animalière de ces sociétés agro-pastorales situes entre Danube et le bord de la Mer Noire. Notre étude porte sur des matériaux fauniques (plus de 30.000 restes) collectés dans sept sites roumains (Cheia, Techirghiol *Dealul Minerva*, Techirghiol *Paloda*, Cernavoda, Baia-Hamangia, Ceamurlia de Jos et Golovița) et un établissement bulgare (Durankulak).
Les études archéozoologiques ont révélé une très grande richesse taxonomique (plus de 45 taxons), principalement liée à l'exploitation d'espèces sauvages en milieu terrestre et aquatique. Dans la plupart des sites étudiés, les restes de mammifères sont prédominants et parmi eux, les animaux domestiques représentent la part la plus élevée. Ainsi, les bovins et secondairement les caprines dominent dans le spectre de faune. Une particularité de l'économie animalière de cette culture est la faible part de cochons qui peut être un indicateur du degré de sédentarisation des populations Hamangia. Dans ces conditions, nous nous demandons si leur absence et / ou leur présence très faibles en pourcentages ne pourrait pas être attribuée à des populations à plus grande mobilité, étant donné les taux élevés de bovins et caprines que l'on trouve dans les différents établissements. Les profils d'abattage des bovins suggèrent une exploitation mixte pour la viande et le lait, tandis que les caprines ont été exploitées principalement pour la viande.

La chasse était une activité qui jouait un rôle secondaire dans la paléoéconomie de la culture Hamangia, si l'on considère les faibles pourcentages observés pour les espèces sauvages dans la plupart des sites étudiées. Cependant, la liste des mammifères sauvages est assez longue, avec 21 taxons. Globalement, les communautés de la culture Hamangia chassaient des espèces de grande et moyenne taille (équidés, cerfs, sangliers, aurochs) ce qui contribuait ainsi à compléter le régime alimentaire en viande tout en épargnant les stocks d'animaux domestiques et fournissant divers autres produits (os, cornes, peaux, fourrures, du sang etc...).

La pêche est une activité saisonnière qui contribue à la diversification de l'alimentation. Les cyprinidés et les percidés étaient les taxons préférés. Des espèces marines sont également présentes notamment dans les sites littoraux. Les individus pêchés étaient de grande ou très grande taille. Les autres animaux, comme les tortues et les oiseaux, sont également consommés. Ils ont livré des matières premières pour réaliser différents objets utilitaires.
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Mots-Clés: chalcolithique, archeozoologie, Roumanie, culture Hamangia

LA COMBUSTION DES BÂTIMENTS CHALCOLITHIQUES EN BOIS ET TORCHIS. UNE PERSPECTIVE DU COTE DE L'ARCHÉOLOGIE EXPÉRIMENTALE

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Le Chalcolithique de l'Europe du Sud-Est est caractérisé par des établissements - tell émergents, des organisations spatiales denses qui présentent des couches de combustion superposées. Au contact avec le feu le matériau composite des structures architecturales, constitué d'argile, de brindilles, de troncs d'arbres et de pailles hachées, avait un comportement variable en fonction de certaines caractéristiques de l'organisation spatiale des maisons et des établissements, ainsi que de l'intensité du tirant d'air de courants atmosphériques. Un courant d'air susceptible d'alimenter et d'intensifier un incendie pouvait être créé à partir de la forme même du bâtiment et des couloirs entre les bâtiments. De plus, la consommation de bois pendant la combustion a créé les prémisses de la formation de canaux qui pourraient amplifier le processus de combustion. Sur ce principe, une série d'allume-feu et de braseros ont été construits, sur lesquels certaines surfaces ont été perforées, afin de contrôler et d'amplifier le processus de combustion à l'intérieur. Dans le cas de l'incendie d'une maison, suite à l'effondrement des structures architecturales, ainsi que dans le cas des planchers en bois, recouverts d'une couche d'argile, les conditions de processus de combustion anaérobique qui ont été créées n'ont pas totalement consommé la matière organique. Suite aux expériences de construction et d'incendie, et après l'excavation des vestiges de combustion, on peut identifier, suite à l'étude de la dynamique d'effondrement du bâtiment, les transformations physico-chimiques du matériau composite, les différents modes de combustion et les différences de température sur les matériaux, ainsi que l'intensité du courant d'air. Cette communication décrira les étapes de combustion dans une expérience de combustion d'une réplique d'une habitation Chalcolithique, ainsi qu'une présentation du matériau brûlé extrait du bâtiment effondré, ce dernier étant comparé aux matériaux archéologiques.

Mots-Clés: Chalcolithique, bâtiments en bois et torchis, combustion, archéologie expérimentale

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L'industrie osseuse du Néolithique récent du site de Pločnik (Serbie)

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Le site de Pločnik se trouve près de Prokuplje, en Serbie de sud. Le site a été découvert pour la première fois en 1927, pendant la construction du chemin de fer. Les premières fouilles ont été effectuées en 1928. Après, on a continué à étudier le site pendant les années 1960 et 1970, et encore en 1996-2011, ensuite en 2012-2013. Le site de Pločnik représente un gisement avec des vestiges archéologiques très riche du Néolithique récent (culture de Vinča) et Enéolithique ancien (culture de Bubanj–Hum I) – céramique, figurines, outils en pierre taillée, en os, etc. L'industrie osseuse trouvée pendant les fouilles en 1996-2011 est analysée du point de vue techno-typologique. Des os divers (métapodes, côtes, astragales, etc.) ont été utilisés, ainsi que des bois de cerf, et on a même trouvé plusieurs coquillages (*Spondylus* et *Glycymeris*). Les types les plus fréquents sont des poinçons fabriqués en métapodes et côtes, des grattoirs fabriqués en côtes, des outils tranchants fabriqués en bois de cerf, etc. On a trouvé aussi des astragales (des bovines et du cerf) avec des traces d'utilisation, parfois avec des perforations. Il y a également quelques ornements – bracelets de coquillage. On a trouvé uniquement un hameçon, fragmenté. On peut reconstruire la chaîne opératoire pour plusieurs types, notamment les poinçons.

Mots-Clés: industrie osseuse, téchnologie, culture de Vinča, Néolithique, Balkans

*Intervenant

SG: AGE DES METAUX

Le Maghreb, un acteur méditerranéen : Contacts et échanges à l'âge du Cuivre et du Bronze

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Pendant longtemps, le Maghreb a souvent été envisagé comme une simple limite géographique sur les représentations cartographiques de la Méditerranée, et dont le rôle aurait été invisible ; par conséquent passif durant la protohistoire. De ce fait, la région ne fut pas considérée avec toute l'attention nécessaire dans les recherches consacrées aux dynamiques d'échanges et de contacts inter- et trans-méditerranéens durant cette période. Cette exclusion trouve sa source dans la vision que l'on avait du Maghreb à cette période. L'existence possible d'un âge du Cuivre et du Bronze y a longtemps été négligée voire réfutée. On considère encore aujourd'hui que la métallurgie n'y est apparue qu'avec les premiers colons phéniciens avec l'introduction de l'usage du fer. Ainsi la protohistoire récente ne démarrerait qu'avec l'arrivée de colons, et les populations indigènes n'étant pas envisagées comme des acteurs potentiellement actifs localement, a fortiori à l'échelle de la Méditerranée.
Pourtant, les témoignages archéologiques sont loin d'être inexistants au Maghreb. Des objets, variés dans leurs types et dans leurs formes, en cuivre et en bronze ont été retrouvés du Maroc à la Tunisie. La région a connu aussi un impressionnant phénomène mégalithique ainsi qu'un important art rupestre atlasique.

Le mobilier métallique est cependant peu présent, résultat d'une recherche inégale et dont les biais sont multiples. Néanmoins, certaines morphologies d'objets sont proches de types de cette période au Proche-Orient et en Europe. Que ce soit des éléments campaniformes retrouvés au Maroc ou des indices d'influences argariques venues d'Espagne, il est difficile aujourd'hui d'ignorer le Maghreb comme probable acteur dans les dynamiques d'échanges et de contacts en trans-méditerranéens durant le Chalcolithique et l'âge du Bronze.

Issue d'un travail de Master faisant la synthèse de l'état des connaissances et de la recherche sur la protohistoire au Maghreb, cette communication aura pour objectif d'estimer les possibles contacts maritimes ayant permis l'émergence d'un développement de la métallurgie du cuivre et du bronze au Maghreb, et de commencer à en évaluer l'échelle et l'impact sur les populations maghrébines.

Les indices sont aujourd'hui assez nombreux pour pouvoir affirmer que les anciens préjugés sur la protohistoire maghrébine n'ont plus lieu d'être. Les recherches récentes suggèrent déjà l'existence de zones clés où se serait produit le développement de la métallurgie du cuivre et du

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bronze, et à partir desquelles une approche multiscalaire permettrait de mieux comprendre la place du Maghreb dans le bassin de la Méditerranée et au-delà, ainsi que l'impact du cuivre et du bronze dans le développement des sociétés protohistoriques maghrébines.

Mots-Clés: Protohistoire, Maghreb, Méditerranée, Métallurgie, Cuivre, Bronze, Contacts, SIG, Âge des métaux

Les objets en coquille d'oeuf d'autruche du Chalcolithique Iberique: une première approche

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L'autruche est le plus gros oiseau qui existe aujourd'hui. Devenu rare dans de nombreuses régions du continent africain, son rôle dans les sociétés africaines est aujourd'hui minime, mais dans le passé, il a été un élément important dans le symbolisme et la vie économique des populations de l'Afrique méditerranéenne. Pendant la préhistoire, une quantité très limitée d'objets fabriqués à partir de coquilles d'œufs d'autruche est arrivée en Espagne. Souvent présents dans des contextes funéraires liés à l'élite, ils témoignent de la grande valeur de ce matériau exotique, mais aussi d'un système d'échange complexe qui existait entre l'Afrique méditerranéenne et l'Espagne préhistorique. Le but de cet article est de nous interroger sur la place des objets fabriqués sur des œufs d'autruche et sur les modalités de leurs échanges.

Mots-Clés: coquille d'oeuf, autruche, Chalcolithique, Iberie

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Un cas d'attaque de grand carnivore sur un individu de Djebel Mistiri. Monuments protohistoriques de Tébessa, Est Algérie

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Le site protohistorique de Djebel Mistiri, situé dans le nord-ouest de Tébessa, (est de l' Algérie), est daté de 2490 ± 110 BP. Il a livré 232 monuments funéraires de type Bazina. Ces structures funéraires sont réparties sur trois crêtes principales et huit crêtes secondaires, occupant un territoire d'une superficie de 15 à 20 km2. Elles sont construites avec des pierres plates en calcaire blanc d'origine locale, non taillées. Cinq de ces monuments ont été fouillés en 1938 par R. Le Dû.
Dans le cadre d'une révision générale des restes humains protohistorique d'Algérie, nous avons effectué l'étude archéo-anthropologique : identité biologique, recrutement funéraire et analyse des modifications artificielles de la surface de l'os ainsi que du contexte de découverte des restes humains issus de ces cinq structures funéraires de Djebel Mistiri.

Les restes osseux étudiés et présentés ici, appartiennent à trois individus adultes issues d'une inhumation plurielle de la grande Bazina N∘5, dont deux hommes et une femme. Ainsi que quatre individus immatures qui ont été recueillis dans d'autres Bazinas de ce site (emplacement exacte inconnue). L'homme adulte H 2 issue de la grande Bazina N∘5, a révélé la présence de traces avérées de fractures *perimortem* que nous interprétons, par les caractéristiques qu'elles présentent, comme étant les conséquences d'une morsure d'un grand carnivore de type félin qui signe un épisode de mort violente. La morsure, probablement aux conséquences létales, a été portée sur la hanche (traces sur le col du fémur et sur l'os coxal).

Les fractures et leur emplacement seront discutés, mais également l'identité du sujet et le traitement de son corps par la communauté ; car ce sujet victime d'un grand carnivore est totalement intégré au sein du cimetière et a bénéficié des mêmes pratiques funéraires que tous les autres.

Mots-Clés: Mort violente, Fracture perimortem, Bioarchéologie, Inhumation, Cimetière, Protohistoire, Monument funéraire, Algérie.

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The painted ceramics from the Chalcolithic mega-site of Valencina de la Concepción (Seville) and their possible relation with northern Morocco

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Ceramics with geometric decoration painted in black or red have been known for a quite long time for the Chalcolithic of the southern Iberian Peninsula, but the provenance and dating of this type of ceramics has been heavily debated. Now this type of pottery seems to be accepted as a highly appreciated local product, appearing not only in funerary contexts but also in settlements. The number of known items from western Andalusia, quite small in comparison to Eastern Andalusia, has now significantly increased, thanks to the rescue excavation undertaken prior to the construction of the new public library in the Chalcolithic mega-site of Valencina de la Concepción (Seville), where they appear in significant numbers and showing diversity of decorative motifs. We will present these ceramics, their context and chronology as well as the possible connections with the fragments excavated in the 1950s by M. Tarradell in the cave of Gar Cahal (Morocco).

Mots-Clés: Calcolithic, Iberia, painted pottery, Valencina de la Concepción, Gar Cahal

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Placing North Africa as a key point in Mediterranean exchange routes in Later Prehistory. A view from the Iberian Peninsula

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During the 4th and especially the 3rd millennia BC, the frequency of exotic objects is significantly increased in the archaeological record, particularly in the South of Iberia. Among them, ivory, amber and ostrich eggshell stands out. Traditionally, ivory and ostrich eggshell were assumed to have a north African origin, although the latest archaeometric studies have shown that provenancing materials is not as straightforward, opening a range of possibilities. Regarding amber, provenance analyses by FTIR have been conducted showing that the amber found in Iberian contexts from at least the 4th millennium BC is *simetite*, whose origin is in Sicily. However, no other evidence of direct contact between Sicily and Iberia are known. Considering that: 1) The distribution pattern of amber objects in Iberia is similar to that of ivory and ostrich eggshell, and 2) Contacts between Sicily, Pantelleria, and Tunisia and North Africa have been proposed on the basis of obsidian trade; we raise the following question: Is North Africa acting as a 'distribution hub' for amber, allowing Sicilian amber to reach Iberia? Is Sicilian amber actually reaching Iberia through contacts with North Africa? In order to answer these questions we aim to share ideas, insights and information with specialists working on the Later Prehistory of North Africa.

Mots-Clés: Later Prehistory, North Africa, Iberian Peninsula, Sicily, amber, exchange networks

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New research into the Bronze Age in the Guadalquivir valley

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The lower Guadalquivir valley is one of the historical hotspots of the Mediterranean region. Favoured above all by a mild climate, good agricultural conditions, large deposits of raw materials in the immediate vicinity and a convenient location, it has been one of the economic and political centres of the Iberian Peninsula for several millennia. Time and again, the region's advantages attracted external interests, including above all the Phoenicians, Carthaginians, Romans and Arabs. Despite the attention it has always received, relatively little is known about the early period of this cultural region in particular. Since 2013, research on the Bronze Age (2nd millennium BC) has been undertaken at various sites in the Seville area, with interdisciplinary teams from the Universities of Tübingen and Seville as part of the Collaborative Research Centre 1070 Resource Cultures. The aim was to record the genesis of the landscape in connection with the use of resources as the basis for the functioning of the societies there. The surveys, excavations and scientific investigations carried out for this purpose have yielded promising results for a better understanding of the course of relevant developments.

Mots-Clés: Bronze Age, Iberi, Guadalquivi, landscape, resources

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The walls of Las Cogotas (Castile, Spain). A defensive system of the Late Bronze Age through to the Iron Age: new approaches from archaeometry

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The site of Las Cogotas is the paragon of the Late Bronze Age in the Spanish plateau and practically in all Iberia. Las Cogotas is a hillfort located near the city of Ávila, just over a hundred kilometres north of Madrid. It was archaeologically known thanks to the massive excavations undertaken by a well-known Spanish archaeologist, Juan Cabré, in the 1920s. Of these, Las Cogotas shows two attached enclosures. The northernmost one, which includes the two napes, with an occupation of the LBA and IA, and the southernmost one, which would provide dates for the end of the IA. Recent excavations confirmed an occupation of the Late Iron Age and its abandonment before, or when, Rome arrives in the region. However, LBA ceramics were found in large areas of the upper enclosure, always without contextual relationship with any construction. An eventual reading of its walls, carried out during a massive restoration work during the first years of this millennium, was published as a proposal for the identification of a walled enclosure from the Bronze Age. Our research has confirmed this possibility and has advanced in the recognition of a LBA walled site through the application of non-invasive archaeological techniques, such as the use of LiDAR images, and reconstruction of the palaeo-landscape.

Mots-Clés: Late Bronze Age, Iron Age, fortification, hillfort, LiDAR

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Between defensive and symbolic. 'Fortified' hill-top sites in the Irish Late Bronze Age

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A steep increase in the number of enclosed hill-top sites in many parts of Europe during the Late Bronze Age has long been taken as a key indicator of increased levels of inter-group violence in the final centuries of the second millennium BC. With more than one hundred Late Bronze Age 'hillforts', the island of Ireland provides an excellent case-study region to test this hypothesis. Based on the Irish evidence we challenge the somewhat simplistic notion that an increase in the number of enclosed hill-top sites primarily reflects an increased need for protection from would-be warlike aggressors. Instead, we maintain that many of the enclosing features observed at Irish Late Bronze Age hill-top sites are not primarily defensive in nature, and that an increased emphasis on social display at an inter-group level provides an important motive for the enclosure of these sites.

Mots-Clés: Late Bronze Age, Ireland, hillforts, warfare, social display

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All that glitters: personal ornamentation in the Middle and Late Bronze Age of Britain and Ireland

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This paper analyses the chronology, spatial distribution, and depositional practices of personal ornaments in the Middle and Late Bronze Age in Britain and Ireland. In addition to the more commonly known gold and bronze ornaments, it incorporates ornaments of amber, shale, jet, lignite, and glass. Evidence for regional consistencies in ornament form, decoration, and association with other objects are evaluated in order to identify patterns of identity, mobility and exchange. Finally, this paper contextualizes personal ornamentation within the broader Bronze Age society by assessing the relationship between ornaments and settlements, field systems, and the dead.

Mots-Clés: Bronze Age, Britain, Ireland, personal ornaments, society

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Dérive chronologique ou changement de paradigme ? Le cas du Bronze ancien en Europe centrale

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Fondée comme discipline scientifique au XIXe siècle, la préhistoire relève des sciences historiques pour lesquelles des informations précises de temps et de lieu sont indispensables pour développer un discours cohérent. En ce qui concerne plus précisément l'étude de l'âge du Bronze, certains de ses outils méthodologiques actuels ont été proposés déjà par Oscar Montelius à la fin du XIXe siècle. Il s'agit notamment de la méthode typologique, largement inspirée de la théorie de l'évolution des espèces de Charles Darwin. Associée à la stratigraphie et couplée au corpus des ensembles clos, elle a fourni un cadre de références sur lequel est bâtie l'évolution chronologique et historique de l'âge du Bronze. Ce noble procédé ne fait cependant plus recette. C'est en effet une méthode exigeante, qui passe par une acquisition longue et astreignante des connaissances. Le développement des méthodes de datation absolue, en particulier le 14C, conduit ainsi certains archéologues à délaisser la typologie, mais ces utilisateurs à tout-va semblent ne pas en mesurer exactement les conséquences. La chronologie du Bronze ancien en Europe centrale fournit un excellent exemple de cette dérive ou s'agit-il en fait d'un changement de paradigme ?

Mots-Clés: Bronze ancien, datation, méthodologie, chronologie, typologie

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Conscious castings and dirty alloys. An diachronic archaeometrical review of copper-based metalworking in the Bay of Iskenderun (southeast Turkey)

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This contribution aims to provide a first critical overview of alloying practices at Kinet Höyük, a multiperiod site located in the eastern extent of Cilicia (southeast Turkey) that was occupied from the Early Bronze Age to the Crusader Era. The paper will review the results of p-XRF bulk analysis of several hundred copper-based items from the 3rd millennium BC to the Early Medieval period, with the historical dynamics of a harbour site as a convenient backdrop to trace continuity and change in Anatolian metalworking on a grand chronological scale.

Mots-Clés: Iskenderun, Metal ages, copper alloy, metalworking, casting

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Contribution à l'étude archéométallurgique du mobilier de base cuivre du Bronze final provenant de la Cova de Can Sadurní (Begues, Baix Llobregat). Nouvelles données typologiques et de composition

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La Cova de Can Sadurní est située dans la localité de Begues, au sud-ouest de la région du Baix Llobregat (Barcelone), et se place sur le versant sud de la chaîne montagneuse de l'Ordal, qui fait partie du complexe karstique et calcaire du Massif du Garraf. Les interventions archéologiques et la recherche sur le site ont été menées depuis 1978, et ont mis en évidence une séquence stratigraphique particulièrement complète, composée d'une consécution de 33 épisodes culturels chronologiquement différentiables, allant de l'épipaléolithique jusqu'à l'époque moderne. La présente étude offre de nouvelles données concernant la connaissance de la phase du bronze final documentée à la Cova de Can Sadurní, à partir de l'étude archéométallurgique d'une épingle à tête enroulée et deux pointes de flèche de type Mailhac. Pour ce faire, le mobilier métallique a été analysé depuis deux perspectives, d'un côté, à partir de l'étude typologique, et de l'autre, moyennant des techniques archéométriques, notamment des analyses de composition par fluorescence de rayons X (ED-XRF). Les résultats permettent d'apporter des données relatives au degré de développement technologique des sociétés productrices, ainsi que sur la mobilité et les réseaux d'approvisionnement des minéraux compris dans cette période complexe, qui se place aux portes des premiers contacts avec la sphère méditerranéenne.

Mots-Clés: Bronze Final, archéométallurgie, ED, XRF, archéométrie, nordest de la péninsule Ibérique, protohistoire

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Morphometrical analysis of the iron knives of the Can Piteu-Can Roqueta Early Iron Age

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The appearance of the first iron objects in the Western Mediterranean and the introduction of iron technology to the region have led to a series of debates concerning the cultural agents involved in this process and their contacts, the adoption of this new technology and its periodization. During the 20th century, archaeological studies focused on determining the wide cultural spectrum of the area, interpreting the introduction of iron as a consequence of acculturating contacts between Mediterranean civilizations, such as Phoenicians as well as Greeks and their subsequent colonial establishment, making technical transmission effective, based on the identification of slags from the 6th century BC. The Type Grand Bassin iron knives (rectilinear, pointed tip and riveted handle) played an important role in contacts between Mediterranean merchants and indigenous communities. They are considered the first objects made of iron to be used and frequently employed as grave goods. To understand the cultural and symbolic importance that iron knives had in these communities, it is necessary to carry out an analysis and contextualization of these particular objects, something that until now has not been conducted in extension or depth. This work, therefore, presents a morphometrical variation analysis of approximately one hundred knives from the necropolis of Can Piteu-Can Roqueta (Sabadell, Barcelona). The application of morphometrical techniques helps us to understand the variability of these items, consequently applying multivariant statistics will allow us to study their functionality further and understand the significance that these objects had for those communities.

Mots-Clés: Early Iron Age, Western Mediterranean, knives, morphometrical analysis

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Metals move, what about people? A view from Finland

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For the early Metal Ages, the area of Kainuu district (eastern Finland) has long been considered a largely deserted area, assumed to only have been used as an occasional thoroughfare between East and West, based on the presence of some individual metal artefacts. This assumption is now being questioned, since the amount of metal artefacts has increased quite a lot. A full picture is still far from emerging, but according to the material available we are clearly dealing with something else than just occasional 'visitors'. What has been going on? We still do not have an answer to that question, but we can begin to create a model. There is an exceptionally large amount of metal casting moulds from Kainuu district, indicating that something else happened between East and West in the early Metal Ages than only short-term contacts. Are these people newcomers or locals? That we can not know. Still, the position of Finland between East and West (in terms of today's borders) has been a challenge that is visible not only in metalwork production, but also in all other aspects of life. How do we describe life and all aspects of it?

Mots-Clés: Early Metals Ages, Finland, Kainuu district, metalwork, casting moulds

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Some traces of Celtic warfare: the weapons from the trophy of La Tène

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Use-wear analysis has been recently employed to disambiguate marks of damage on Celtic weapons of La Tène (Switzerland). Traces relating to combat use, i.e. produced incidentally in the course of fighting (at war, during battles), and traces resulting from intentional damage during religious rituals (a frequent phenomenon in the Gaulish context) can indeed be distinguished. These results have been obtained thanks to the combination of various disciplines that are very little or not usually used in Iron Age studies: experimental archaeology, forensic science, biomechanics, ethnoarchaeology, materials engineering, applied mathematics, anthropology, forensic medicine and battlefield archaeology. The formulation of this new field of study and the consideration of restoration techniques brings to light new evidence relating to the fighting techniques of the ancient Celts and provides a better understanding of Celtic warfare. The focus of this contribution will be on some results from these new studies.

Mots-Clés: Iron Age, Celts, warfare, weaponry, use, wear

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The rise of the Celtic culture in the south-eastern Alps – Report on new archaeological research in Styria

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In the south-eastern Alps, especially in Styria (southern Austria), archaeological research on the La Tène culture has gathered new intensity through larger archaeological excavations. This new data, especially from newly excavated cemeteries like the one next to the so-called, well-known Early Iron Age burial mound Pommerkogel near Kleinklein, forms the basis for a PhD project that also deals with questions concerning the formation of Celtic culture. Together with new research from Styria and the Slovenian Štajerska region, new light will be shed on this subject on the basis of finds analysis and comparisons. Even the transition from the Hallstatt to the La Tène period and the question of the Celtic migrations will be in focus. The preliminary results of this study will be presented and will be discussed in a wider context.

Mots-Clés: Iron Age, Hallstatt, La Tène, Celtic culture, migration

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LES IMPLICATIONS ARCHEOMAGNETIQUES ET ARCHEOLOGIQUES DES ANALYSES MAGNETIQUES DES STRUCTURES DE COMBUSTION PROTOHISTORIQUES.

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L'application des méthodes d'analyses en magnétisme des roches sur des échantillons archéologiques ont permis d'étudier respectivement l'évolution progressive de l'aimantation des terres cuites lors des traitements physiques et des analyses magnétiques, et celle de la lecture archéomagnétique de sa fiabilité. Les implications d'une telle approche méthodologique sont multiples.
D'un point de vue géophysique, l'exploitation des structures de combustion dont les critères de validité n'obéissent à pas ceux définis par l'archéomagnétisme classique, a permis de renseigner sur la direction du champ magnétique terrestre ancien, où les structures de combustion protohistoriques peuvent être moins bien stables thermiquement.

D'un point de vue archéologique, ces analyses ont permis de tracer les histoires thermique et mécanique de certaines structures de combustion, et d'estimer leur archéotempérature maximale de cuisson. La présentation des résultats de l'étude de deux structures de combustion S1 et S2 datant de 1010 ans avant JC, montre l'intérêt de ces nouvelles données. L'analyse de la juxtaposition de deux composantes de l'aimantation thermorémanente pour S2 a révélé une histoire thermo-magnétique complexe, traduisant deux phases de cuisson différentes séparées par un remaniement mécanique partiel.

Outre l'intérêt d'exploiter des structures de combustion moins stables pour prolonger la courbe de datation archéomagnétique pour des périodes anciennes, cette approche méthodologique a constitué un outil d'étude de l'histoire archéo-thermique des structures de combustion, et de vérifier en retour, les hypothèses relatives à la nature de leur fonction.

Mots-Clés: Archéomagnétisme, protohistoire, structures de combustion, histoire thermomagné-

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tique, archéotempérature de cuisson, remaniement mécanique archéologique.

SG: RECHERCHES ACTUELLES SUR LES AGES DES METAUX

Depuis les origines de la recherche préhistorique, les variations du climat et ses influences sur les peuplements des premières humanités sont apparues aux pionniers de l'archéologie préhistorique non seulement comme une évidence mais aussi comme la preuve de l'ancienneté de l'Humanité.

Edouard Lartet découvre en 1864 lors de ses fouilles de l'abri-sous-roche de La Madeleine en Périgord, un mammouth gravé sur un fragment d'ivoire de défense de mammouth. Il démontre ainsi la cohabitation de l'espèce humaine avec une espèce disparue vivant sous un climat glaciaire. A la fin du XIX° siècle, les découvertes de faunes froides et chaudes se multiplient montrant que l'Humanité a du faire face avec succès à des changements climatiques importants révélant l'alternance de périodes glaciaires et interglaciaires. Au début du XX° siècle, les travaux de glaciologie de Penck et Brückner (1901-1909) sur les vestiges de moraines de front de glaciers dans les Alpes, mettent en évidence pour la première fois la succession des périodes glaciaires nommées Würm, Riss, Mindel, Gunz. Les recherches s'étendent aux rivières et aux fleuves, qui, par l'alternance climatique, par alluvionnement ou surcreusement, créent des vallées aux terrasses étagées, prouvant ainsi l'ancienneté des découvertes de Casimir Picard et de Boucher de Perthes dans la vallée de la Somme entre 1830 et 1860.

Il n'est donc pas étonnant de constater que les préhistoriens soient devenus les premiers paléoclimatologues de l'histoire des Sciences. Les carottages spectaculaires dans les glaciers du Groenland et du continent antarctique, ne doivent pas faire oublier les nombreuses autres méthodes de reconstitution du climat, qui permettent de construire des courbes de paléo-température, de paléo-précipitations et/ou d'autres courbes encore : séquences de lœss et de sols fossiles (en périphérie des inlandsis), séquences de sable et de sols fossiles (en zones désertiques), carottages océaniques et méditerranéens (à partir de l'inventaire des espèces à squelette minéral, comme les foraminifères ou les coccolithophoridés, particulièrement sensibles aux variations de température des océans), séquences de remplissage d'abri-sous-roche et de grottes, carottages dans les sédiments des lacs volcaniques (maars), des lacs de montagne, des marais (tourbières) pour en extraire les pollens, l'altitude des lignes de rivage fossiles, etc.

La paléoclimatologie moderne est née dans les années 1970, avec la multiplication des carottages profonds. Cette nouvelle science est multidisciplinaire car s'y rencontrent l'ingénierie des carottages profonds (venant de l'industrie pétrolière), les prélèvements (bulles d'air, pollens, fossiles, etc.), les déterminations d'espèces fossiles, les mesures isotopiques (pour la courbe O^{18}/O^{16}), géochimiques (oxygène, azote et CO2 des bulles d'air) et de susceptibilité magnétique, les datations absolues (pour synchroniser les séquences), le traitement du signal (pour comparer les courbes obtenus en traitant la sédimentation différentielle et les lacunes), les traitements statistiques (pour calculer les fonctions de transfert), la modélisation mathématique (modèle de circulation atmosphérique, de transition climatique, etc.).

Certaines de ces méthodes permettent de construire seulement des courbes de paléo-température. C'est le cas notamment des carottages glaciaires (courbe O^{18}/O^{16}). D'autres permettent de construire aussi des courbes de paléo-précipitations, qui sont encore plus utiles pour le peuplement préhistorique car l'humidité favorise la croissance de la végétation dont la faune des herbivores se nourrit, faune que les prédateurs (carnivores et chasseurs) consomment. C'est le cas des espèces fossiles animales et végétales, pour lesquelles les analyses multidimensionnelles permettent de mettre en évidence des axes de température et des axes d'humidité à partir desquelles sont construites les paléo-courbes (pollens, foraminifères, etc.).

Pour les chasseurs-cueilleurs, durant le dernier million d'années du Pléistocène, la présence dans une région géographique, la localisation des sites archéologiques, le territoire de déplacement des groupes humains, la gestion des ressources alimentaires durant le cycle annuel, la culture matérielle (industrie lithique, industrie sur os, ivoire et bois de cervidés), l'art animalier figuré (comme au Sahara), le franchissement ou non de cols et de détroits, sont autant d'informations qui permettent de mettre en évidence l'adaptation des groupes humains aux changements climatiques.
Pour les agriculteurs/éleveurs, les variations climatiques des derniers douze mille ans de l'Holocène furent nombreuses : holocène ancien chaud et humide, évènement froid 8200 BP, évènement aride 4200 BP, événement aride 2400 BP, optimum empire romain (200 av. J.C. – 400 ap. J.C.), optimum climatique médiéval (X°-XII° siècle), petit âge glaciaire (XIII° - XIX° siècle). Ces variations eurent des conséquences considérables pour les sociétés sédentaires agro-pastorales : désertification du Sahara, émigration du Moyen-Orient et néolithisation de l'Europe, abandon de l'agriculture pour le pastoralisme, aménagement du paysage pour l'irrigation (bassins de retenue du Nil, canaux d'irrigation en Asie centrale et en Mésopotamie, drainage des deltas, mise en terrasses des versants montagneux). La nécessité de ces travaux communautaires est sans doute à l'origine des premières étatisations des sociétés. Mais ces structures encore fragiles furent également victimes d'épisodes froids et arides à l'origine d'effondrements comme pour les épisodes à 8200 BP et 4200 BP.

Ce sont les études des relations entre les sociétés humaines depuis les origines jusqu'aux temps historiques qui font l'objet de la session proposée au XIX° congrès UISPP (Meknès, Maroc)

Humanity facing climate change : from the origins to early historical times

Since the origins of prehistoric research, variations in climate and its influences on the peopling of the early humanities have appeared to the pioneers of prehistoric archaeology not only as an evidence but also as the proof of the earliest age of humanity. Edouard Lartet discovered in 1864 during his excavations of the rock-shelter of La Madeleine in Perigord, a mammoth engraved on a fragment of ivory tusk of mammoth. It thus demonstrates the cohabitation of the human species with an extinct species living under a glacial climate. At the end of the 19th century, discoveries of cold and warm faunas have multiplied, showing that humanity had to successfully cope with significant climate changes revealing the alternation of glacial and interglacial periods. At the beginning of the 20th century, the glaciology work of Penck and Brückner (1901-1909) on the remains of glacier front moraines in the Alps, highlight for the first time the succession of ice ages called Würm, Riss, Mindel, Gunz. The research extends to rivers, which, due to alternating climates, by siltation or over-digging, create valleys with terraces, thus proving the very old age of the discoveries of Casimir Picard and Boucher de Perthes in the Somme Valley between 1830 and 1860.
It is not surprising, then, that prehistorians became the first paleoclimatologists in the history of science. The spectacular cores in the glaciers of Greenland and the Antarctic continent should not overshadow the many other methods of climate reconstruction, which allow the computation of palaeo-temperature curves, palaeo-precipitation curves or other curves: sequences of lœss and fossil soils (on the periphery of ice sheets), sand sequences and fossil soils (in desert areas), oceanic and Mediterranean cores (from the inventory of mineral-skeletal species, such as foraminifera or coccolithoforids, particularly sensitive to changes in ocean temperature), stratigraphic sequences of rock-shelters and caves, cores in volcanic lake sediments (maar), in mountain lakes, in marshes (bogs) to extract pollen, altitudes of fossil shore lines, etc.

Modern palaeoclimatology was born in the 1970s, with the multiplication of deep cores. This new science is multidisciplinary using deep core engineering (from the oil industry), sampling (air bubbles, pollens, fossils, etc.), fossil species determinations, isotopic measurements (for the O^{18}/O^{16} curve), magnetic susceptibility measurements, geochemical measurements (oxygen, nitrogen and CO2 of air bubbles), absolute dating (to synchronize sequences), signal processing (to compare curves obtained having differential sedimentation and gaps), statistical treatments (to calculate transfer functions), mathematical modeling (atmospheric circulation model, climate transition model, etc.).

Some of these methods allow only constructing palaeo-temperature curves. This is particularly the case for ice sheet cores (O^{18}/O^{16} curves). Others allow also the construction of palaeo-precipitation curves, which are even more useful for prehistoric peopling because humidity increases the growth of vegetation that feeds on herbivorous fauna, wildlife predators (carnivores and hunters) consume. This is the case for animal and plant fossil species, for which multidimensional analyses allow to highlight temperature axe and humidity axe from which palaeo-curves are built (pollens, foraminifera, rodents, etc.).

For hunter-gatherers, during the last million years of the Pleistocene, the peopling in a geographical region, the location of archaeological sites, the territory of traveling of human groups, the food resource management during the annual cycle, the material culture (lithic industry, bone, ivory and deer wood industry), figurative animal art (as in the Sahara), the crossing or not of passes and straits, are all information that helps to highlight the adaptation of human groups to climate changes.

For farmers/breeders, the climatic variations of the last twelve thousand years of the Holocene were numerous: hot and humid early Holocene, 8200 BP cold event, 4200 BP arid event, 2400 BP arid event, optimum of the Roman empire (200 BC – 400 AC), medieval climatic optimum (10th-12th century), small ice age (13th - 19th century). These variations had considerable consequences for sedentary agro-pastoral societies: desertification of the Sahara, emigration from the Middle East and neolithization of Europe, abandonment of agriculture for pastoralism, landscaping for irrigation (Nile reservoirs, irrigation canals in Central Asia and Mesopotamia, drainage of deltas, terraces of mountain slopes, etc.). The need for such a community work is probably at the origin of the first state ownership of societies. But these still fragile structures were also victims of cold and arid episodes that caused collapse as for the 8200 BP and 4200 BP episodes.

It is the studies of the relationship between human societies from the origins to the historical times which are the subject of the proposed session at the 19th UISPP Congress (Meknes, Morocco)

Découverte récente de monolithes en Guinée-Bissau

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Le mégalithe est souvent décrit comme, constitué d'une ou de plusieurs pierres de grandes dimensions généralement appelées menhirs, dolmens et cromlechs dressées dans la terre par des groupes humains hiérarchisés. Si on en trouve partout sur la planète, leurs fonctions semblent être différentes (tombes pour élites, inhumations collectives ou lieux de pratiques rituelles sans inhumations). D'Angleterre, ou les premiers mégalithes (Stonehenge) ont été trouvés en passant par l'Asie jusqu'en Afrique et plus particulièrement en Sénégambie (Sénégal, Gambie), ces pierres généralement dressées ont été interprétées différemment. Dans la sous région, les mégalithes ne sont documentés qu'au Sénégal et en Gambie.
Toutefois, une mission de recherche archéologique (du 30 au 5 octobre 2018) du Département d'Histoire de l'Université Assane Seck de Ziguinchor en Guinée Bissau plus particulièrement aux environs de Bafata a mis en évidence la présence de monolithes comme ceux trouvés au Sénégal et en Gambie. Cette trouvaille fait reculer les frontières du mégalithisme ouest africain dans un secteur encore jamais soupçonné. Les monolithes retrouvés non dressés, laissent subsister pourtant des questions. Quels sont les groupes humais qui sont à l'origine de cette culture en Guinée-Bissau ?

Ces monolithes étaient- ils dressés ? Sont-ils tombés naturellement ?

Comment ses pierres ont pu être transporté jusqu'à leur emplacement actuel ?

Quels rôles ces pierres ont-elles jouées ?

Les prospections effectuées autour de ses monolithes ont permis de découvrir de la céramique et autres petits objets en fer qui ne nous permettent pas d'avancer un âge. Toutefois, les populations disent avoir trouvé ses pierres à leur emplacement actuel en occupant cet endroit.

De ce fait, même si ce phénomène mondial de mégalithisme montre un décalage chronologique, une convergence empirique ne peut être écartée car il s'agit d'une pratique de peuples qui se situent à des milliers de kilomètres, dont la seule migration ne semble pas justifier.

Mots-Clés: monolithes, Guinée Bissau, découverte, mégalithique, Sénégambie

*Intervenant

Sur quelques monuments funéraires de la Téfedest. Ahaggar, Algérie

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Les recherches que nous avons menés sur les monuments funéraires de la Téfedest dans le cadre du projet " Habitat et monuments funéraires du Sahara central dans leur cadre chronoculturel " montrent que cette région à l'instar de tout l'Ahaggar, est très riche en architectures funéraires de différents types. Il est question dans cette présentation de cartographier tous les monuments funéraires repérés lors de nos missions de terrain et de présenter ceux que nous avons fouillés.

Mots-Clés: Monuments, Funéraires, Téfedest, Ahaggar, Types, Cartographier, fouillés.

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New approaches to collect and treat massive data from Bronze Age funeral structures in Mongolia

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Studies carried out in extreme environments involve many constraints: human, material, and temporal. It is therefore necessary to adapt data acquisition to these harsh conditions, while maintaining the capacity to collect enough information to answer the main research questions. For the study of Bronze Age burial structures in Mongolia, two methods based on photogrammetry have recently been developed within the framework of the Monaco-Mongolia mission. These methods offer new approaches for processing field data.
The first method was tested on the emblematic funeral stelae known as deer stones. Photogrammetric acquisition is carried out on-site using a simple camera. Models are computed in the laboratory and processed using a new method based on ambient occlusion, which allows the model to be recolored. Ambient occlusion creates a strong contrast between the edges and the footslopes, making the limits of engravings much easier to distinguish.

The second method was tested on aerial pictures of large, dry-stone funeral structures, where the stelae were discovered. Orthomosaics and digital elevation models obtained by photogrammetry provide a clear view of the organization of these sites. To facilitate the processing of this abundant documentation, a method based on machine learning has been developed. It quickly and automatically delineates each individual stone from the images.

Both pipelines are quick to implement in the field and, later, in the laboratory, allowing massive data collection during each field mission.

Mots-Clés: Bronze Age, Mongolia, rock art, deer stone, documentation, recording methods

*Intervenant

The Nuraghe Factory. A methodological approach to the analysis of construction processes

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The beginning of the Middle Bronze Age (XVIII-XV century BC) up to the First Iron Age (IX-VII BC) is the chronological context in which the Nuragic Civilization developed in Sardinia. In this historical period, the Nuragic populations expressed their constructive vocation through the design and construction of unique architectural types such as the Nuraghi, the Wells and the Sacred Springs, the "Tombs of Giants". Considering the large amount of works carried out and spread throughout the island, it can be assumed that, in that specific historical period, the Nuragic people had at their disposal a wealth of acquired technical experience and consolidated construction practices. This study provides with a hypothesis about the methodology adopted in the construction of a tholos nuraghe with the aim of understanding its logical process, i.e. the planned and ordered sequence of coherent and coordinated activities, which are functional to execution of the work. From the graphic-dimensional analysis of some representative nuraghi, this study investigates the technical-dimensional characteristics of the walls and of the internal rooms with tholos vaulting, the development of the helical staircase that connects the different levels of the building up to the identification of the construction methods. In order to interpret and reconstruct in detail the construction site activities, the required manpower during the construction, a quantitative analysis method was applied to support the estimate of the construction works according to a methodology already developed by J. DeLaine. This methodological approach makes it possible to identify how the planning of the construction activities might have been conducted based on a theoretical elaboration of the intended design. This by dividing the activities into phases, allocating the roles and skills to the various workers involved, organising the construction site and the related layout of the spaces, managing the procurement of materials and their processing, up to the point of establishing, with reasonable approximation, the times of realization. From this study derives furthermore the observation that the constructive effort of this architectural typology is to be understood not only as the physical representation of a technological culture, but also as a representation of the organization of the territory, its rational and orderly use and optimization of the available resources. But, even more, it allows us to understand the social and economic organization of that large and choral Nuragic community, which was able to express such complex constructions.

Mots-Clés: Keywords: Nuraghi, construction process, Nuragic construction site

*Intervenant

Ramaditas, Caravans of the Formative Period in the Atacama Desert, Northern Chile.

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Early village development characteristic of the Ramaditas-Guatacondo in the Atacama Desert in Northern Chile is a key area for the study of the Formative Period (2500-1900 B.P.). There, several archaeological sites fit the model of extensive Pre-Columbian use of camelids (especially of llamas) for caravan transport of both mundane and exotic goods. The requirement of self-sufficiency in an unusual ecological situation gives it characteristics that modify the caravanserai model. In particular, the economic and ecological aspects of trails in the Atacama Desert. Camelid maintenance and human sustenance may conflict in an environment that is extreme in several ecological parameters. Complementing this setting, a complex array of earth figures called "*geoglyphs*" are interpreted as route signs that help guide the caravans through the desert.

Mots-Clés: Atacama Desert, Caravanserai model, Geoglyphs, Northern Chile

*Intervenant

Horses and dogs, companions of the Bronze and Early Iron Age people, North of the Lower Danube

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The horse and dog skeletons in the Bronze and Early Iron Age archaeological sites on the territory of today Romania are not a rare occurence. Despite that, if we consider the direct (bones, fragmentary and entire skeletons) and indirect (in the case of the horses: harness pieces or charriot parts; burnt clay and metal figurines) evidences, the amount of information that could be obtained of these is scarce and rather lacunary, at least for the Bronze Age. Most of the evidences come from the settlements and they prove that the horse was mostly used as a food source, but also for vehicles traction and riding.
With regard to the dogs, most ot their osteological remnants were recovered from the settlements (belonging to the Glina, Tei, Monteoru, Wietenberg, Vatina, Verbicioara, Noua cultures etc.). They were used for protection, hunting and sometimes, as food. An inhumation of a complete dog was unearthed at Schitu, a settlement of the Early Bronze Age. Remains of some horses and dogs, most probably being consumed during some funerary banquets, were found in the burials from Năeni. Other complete horse inhumations were documented in the Noua Culture of the Late Bronze Age. In the tumuli from Negrileşti and Ripiceni, there were such finds, belonging to nomadic people, who came from the North-Western space of the Black Sea.

Subsequently, in the Early Iron Age, dispersed, cremated and uncremated horse and dog bones, were identified in a series of burials, both flat and tumular ones (Ciulniţa, Meri, Vedea, Tigveni). Complete skeletons of horses, or dogs were discovered in some funerary monuments, at Histria and Zimnicea, as well as in complexes,‘ outside some settlements (Ulpia Traiana Sarmizegetusa).

Mots-Clés: Bronze and Early Iron Ages, Lower Danube, animal companions, horses and dogs

*Intervenant

Convergent trends, parallel roads: rock art and megaliths in the Tagus basin

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The assessment of the Tagus valley rock art has mostly clustered around chronology, the vicinity to megaliths playing an important part in such debate. While there are insufficient evidences to assert the two main archaeological variables (time and direct spatial contacts), assessment of the iconography, the visual impact and the associated archaeological materials, allows for interpreting possible structural functions of both, and these would suggest not only a difference (which might be explained by complementarity) but a substantial divergence: the landscape setting not only the rock art carved cycle predates megaliths and persists until later moments, but the moments of major carving efforts seem, also, to correspond to an earlier Neolithic and to a later Bronze age. In this sense, a displacement from the river pathways up to the hills seems to occur as part of the megalithic spread, and this would be a fundamental strategic shift in mobility patterns and land use, also expressed through displacement from a landscape primarily focused on the riverine economy (and rock art carvings substantiating it) into a landscape focused on soil intensification economy expanding inland, combined with growing long-distance interaction with Mediterranean regions, including Norther Africa, during the Chalcolithic.

Mots-Clés: Convergent trends, parallel roads, rock art, megaliths, Tagus basin

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The tholoi in the Center and South Portugal at the end of Megalithism: social contexts and pan-Mediterranean framework

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At the beginning of the 3rd millennium a.n.e. a set of changes takes place, changing the social, mental, and ideological structure of the peasant communities in South Iberia: copper metallurgy, walls, exotic materials and ... *tholoi*.

The analysis of this phenomenon is carried out through different scales: a peninsular perspective, which includes the dynamics of contacts on both shores of the Mediterranean and a micro-regional analysis that analyzes the social contexts where these changes are inscribed.

In the Center and South of Portugal, these changes take place in very different social and regional contexts. In the Center (Estremadura), the appearance of the *tholoi* is part of a panorama of great diversity of sepulchral types: dolmens, artificial caves and many natural caves. The south of the Tagus, the Middle Alentejo, presents the highest concentration of orthostatic sepulchres in Iberia (1670), with very few *tholoi*. In this megalithic landscape, in Reguengos de Monsaraz, appears a unique case of megalithic complexes of dolmen and tholoi. Finally, *tholoi* appear associated with ditch enclosures in South Portugal (as in Alcalar, Porto Torrão or Perdigões).

This communication will analyze the different regional contexts through case studies, without forgetting the broader scope of the Mediterranean.

Mots-Clés: Tholoi, Chalcolithic, Chronology, Megalithism

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The anthropological study of the human-horse interaction. The case of the skeleton discovered at Ripiceni (Botoşani County) from Romania, dated back in the Bronze Age.

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The funerary finds, bringing together the human skeleton accompanied by an animal, usually a horse, or a dog, had stirred the greater interest of the scientific community, at least in the past decades of their study. Thus, the anthropological and archaeological research had emphasized not only the tight connection exiting between the master and his animal companion, but also the consequences of their interactions. Due to their activities shared together, between the human individuals and their horses, some special kind of relationships had been established. Moreover, being involved in riding, as this was one of the most important utilities of the horse, the human skeleton had undergone some changes, as determined by its frequent practice. The so-called activity-markers of an individual could be traced on the bones of an individual and, the more complete the skeleton would be, the more relevant information would be obtained! This paper refers to the funerary find from Ripiceni (Botoşani County) that contained a human individual, buried together with his horse.

Mots-Clés: human, horse interaction, skeleton, Ripiceni, Botoşani County, Romania, Bronze Age.

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GRAVES OF HORSEMEN IN LATE HALLSTATT PERIOD SOUTH OF CARPATHIANS, WITH SPECIAL REGARD TO THE NECROPOLIS FROM VALEA STÂNII (ROMANIA)

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The paper focuses on the graves of mounted warriors in the archeological group Ferigile (south of the Carpathians, the 7th-5th centuries BC), especially on the incineration necropolises from Ferigile, Tigveni, Cepari, Rudeni and Curtea de Argeş, and offers a detailed look at this kind of spectacular tombs from the newly investigated necropolis at Valea Stânii (Argeș County). I will try to follow first of all quantitatively the spread of the tombs of horsemen in the whole Ferigile group and the way of funeral expression of the presence of the horse in the grave of the rider warrior (usually a symbolic presence). Then I will insist on the situation illustrated by the incineration necropolis from Valea Stânii. They are presented the clues that allow the attribution of some of the graves to the elite group of mounted warriors: not only the horse-harness parts deposited as a grave goods, along with weapons, but also some pits with ashes and animal (including horse) cremated bones placed at the fringes of graves. The rarity of this kind of occurrence could indicate eventually a much closer connection between man and animal. The analysis of the horse-harness elements attests to large-scale supraregional contacts, at the interference between the Thracian, Scythian and Illyrian cultural milieux.

Mots-Clés: GRAVES OF HORSEMEN, LATE HALLSTATT PERIOD, SOUTH OF CARPATHIANS, NECROPOLIS, VALEA STÂNII, ROMANIA

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LiDAR prospection in the service of endangered archaeological sites. A case study from the Carpathian Mountains

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Too many archaeological sites across the world have already been lost due to anthropic interference or natural hazards. Nevertheless, there are still several archaeological landscapes that survived completely unspoiled, especially because they are located in remote or inaccessible environments. This is the case of forested mountains tops in central Europe that still hide numerous unresearched prehistoric or Medieval forts, roads and battlefields. Remote as they are, some of these unspoiled archaeological landmarks have become also threatened as development projects continue to grow, or precisely due to their remoteness – making them vulnerable to heritage looters.

In order to get protection, these landscapes have first to get known in their entirety. Due to their remoteness and difficult environmental nature, even the access of researchers remains limited, hampering and delaying their understanding. LiDAR applications are for sure game changers that could expand the research horizons on the highest peaks and under the canopy.

In this presentation we will discuss the benefits and challenges of this technology using examples recently collected in a Romanian project dedicated to the exploration of the Eastern Carpathians.

Mots-Clés: LiDAR prospection, endangered archaeological site, Carpathian Mountains

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Dogs' remains in ritual context during the 1st millennium BC northern Thrace

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The analysis will take into consideration several archaeological contexts of depositional character in which entire or partial dogs' skeletons occur, based on which we will argue that the sacrifice of dogs was a consistently persistent and, thus, characteristic feature of the rituals performed by Thracian people throughout the entire 1st millennium BC until the Roman conquest, in sites considered sanctuaries (like the fields of pits from the Aegean into Transylvania or Dniester), in the sacred areas comprised inside settlements, or in offering pits under tumuli. The analysis will investigate the chronological dynamic and intensity of this practice, attempting to identify regional trends. The inquiry will consider evidence of consumption, infliction of violence or symbolic construction and representation by associating the dog remains with various categories of artefacts or actions.

Among the discussed cases will be the dogs sacrifices in central places and sanctuaries around 10th-9th centuries BC at the Lower Danube, with analogies in the Rhodopi area, the occurrence of dogs in ritual setting in the first indigenous settlements founded in the late 6th century BC in the western Pontus area after the Archaic Greek colonization. A comparison of the phenomenon with the sacrifice of dogs during funerary events performed during the Late Iron Age will be attempted, by considering its intensity on geographical and chronological grounds.

We will also show that in those areas of Thracian presence, not comprised in the Roman state, like the western peripheries of the Roman province of Dacia, under Sarmatian influence, or the eastern fringes around Tyras, the habit of depositing dogs in pits with a strong ritual nature, continued throughout and outlasted the Roman authority.

Mots-Clés: Dogs' remains, ritual context, the 1st millennium BC, northern Thrace

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SG: ART PREHISTORIQUE

SOWING STONE ON ASHES: CONTRIBUTION OF MICROMORPHOLOGY TO THE UNDERSTANDING OF RITUAL PRACTICES

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Fire is arguably one of the tools most widely used during the Neolithic, for various purposes, from tool making and soil clearance to lightening and ritual performances. Most of the evidences of fire related archaeologically recorded features are agriculture related. However, there are few less reported cases associated to ritual practices and constructions, namely under megalithic monuments contexts. There are not too common and there is a scarce use of appropriate methodologies that may not only establish the natural or intentional causes of firing but also recognise the causes and effects of specific firing.
In the archaeological record of the Middle-Lower Tagus basin, in Portugal, evidences related to pigments heating (for rock art paintings), lithic debitage processes (namely pressure flaking) or transformed raw materials (e.g. ceramics, bronze) are abundant.

The study of Anta 1 de Vale da Laje had suggested, from the end of last century excavations, that fire might have been strongly used in the clearing of the surface on which the passage grave was built, as indicated by an enriched layer of phosphate, namely phosphorus, partially resulting from a likely slash-and-burn vegetation cover management. This hypothesis was also endorsed by the absence of evidence of any ditch, as a source for sediment materials for building the burial mound, thus suggesting a wider surface scrapping, itself requiring a prior clearance procedure. The use of fire was also considered a possible explanation for the fragmentation pattern of some of the stones associated to two sub-circular collapsed structures, built on top of the mound on both sides of the passage grave entrance, interpreted as ritual features whose main elements should have been made of wood.

Micromorphology is one the methodologies currently been applied for assessing fire and burning evidences in Archaeology. The Anta 1 de Vale da Laje megalithic monument, a passage grave in Portugal is one of sites that has been studied within the context of firing, using micromorphology analysis techniques.

Micromorphology confirmed and detailed the stratigraphic sequence of construction and usage

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layers of the monument, having confirmed the hypothesis of fire clearance of the surfaces, before the construction. Archaeobotanical studies has revealed a prior wooden cover, with a mix of shrub vegetation type. The need for total and fast vegetation clearance was possibly the reason leading to set a fire which allowed faster clearance through burning, an episode which is neatly recorded in the thin sections from the site. The paper details the assessment of these evidences and further presents the analytic methodology, both in the field and in the samples processing.

Mots-Clés: Fire, Neolithic, Micromorphology, Passage grave, Megalithic Monument

Les gravures rupestres du versant nord-occidental de l'Adagh des Ifoghas (Mali) : des thèmes déterminés par l'orientation des supports

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Au nord-ouest de l'Adagh des Ifoghas, les éperons granitiques situés en bordure de vallées faciles d'accès ont constitué les lieux d'expression privilégiés des graveurs. La station d'In Tahaten fait exception de par son éloignement de la vallée de Tessalit : on l'atteint en empruntant un sentier de montagne qui débouche sur une mare à l'aplomb de laquelle ont été réalisées plus de cent gravures. Malgré cette situation particulière, les représentations rassemblées à cet endroit renvoient aux mêmes thèmes que ceux figurés par ailleurs. Plutôt que la topographie et l'hydrographie, c'est l'orientation des supports qui semble avoir déterminé la nature des expressions. Ainsi les dalles aux surfaces étendues recouvrant l'éperon granitique d'Issamadanen sont ornées de cupules et de signes curvilignes (cercles concentriques, cercles à cupule centrale, cercles à appendice, disques entièrement piquetés, spirales, alvéoles, arciformes, ...), qui sont autant de pétroglyphes absents sur les pans verticaux et obliques des rochers de la région décorés de milliers de figures humaines et animalières. L'existence d'un art abstrait sur supports horizontaux, donc faisant face au ciel, n'est pas exclusive à l'Adagh des Ifoghas ; cette situation s'observe aussi dans d'autres régions sahariennes : Ahaggar, Tassili-n-Ajjer, Sud-marocain. Cela peut-il avoir un rapport avec la pluie ?

Mots-Clés: Sahara, Gravures rupestres, Dalles et art abstrait, Parois et art figuratif, Eau du ciel

*Intervenant

Rock art and Water: some remarks on the rock art landscape from the Aswan region

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Studying rock art has been changed from focusing on the rock art itself to study the context that rock art has been put in. The answer to questions, such as why they made their rock art in particular places is on the top priority of the rock art export. The way of analysing rock art landscape proved very important information not only about the rock art itself but about the whole landscape of the site.
In Aswan region, south of Egypt, there is a unique landscape, full of rock art and rock inscriptions. The relation between rock art and The Nile River and the dry Wadis coming from Eastern and Western desserts is very obvious. In this presentation, I will try to show the remarks of the survey work on the region, to show the clear relation between late Palaeolithic and Epi-palaeolithic rock art locations and water.

Mots-Clés: rock art, Palaeolithic, Epi, palaeolithic, Aswan, Egypt

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Practical and Interpretive Implications of Experimental Hand Imprints

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The act of imprinting hands cuts across spatial and temporal boundaries and shows ubiquitous behavioural practice and reflects cognitive fluidity. The exercise of replicating ways of making hand imprints is helpful in digging out underlying anatomical mechanics and adaptability of hands. These imprints apart from expressing left or right orientation, incorporate hand ability, skill and preference linked to the broader concept of handedness. This opens interpretive challenges due to undercurrents of mixed-handedness and ambidexterity, along with contributing factors from an embedded socio-cultural matrix, if any. The intersecting web of haptics, embodiment and laterality integrates a theoretical and interpretive framework for this qualitative and quantitative trait. Hand motifs can have multiple symbolic and non-symbolic meanings, varying from one society and culture to another in deep, historical and contemporary times. As a result of its diverse contextual and detailed dynamic manipulation, hand imprints hold much more than meets the eye.

Mots-Clés: Hand Imprints, Rock Art, Haptics, Embodiment, Laterality

*Intervenant

Enigmatiques blocs gravés d'Ihatoussene (Haute Kabylie, Tizi Ouzou, Algérie)

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Le village Ihatoussene, distant de 70 km du chef lieu de la wilaya de Tizi Ouzou, est bâti au pied d'une falaise (ech-Chfar), au sud du massif de l'Akfadou. Les maisons étaient construites en pierres sèches. Certains blocs gréseux des murs épais, de quelques maisons collées à la falaise, portent des gravures piquetées par de fines cupules. Ces blocs gravés proviennent surement d'un abri préhistorique qui a servi de carrière pour la construction des maisons du village.
Un premier relevé, effectué sur l'un des blocs, laisse apparaitre les figures d'anthropomorphes, de zoomorphes, des formes symboliques dont des caractères alphabétiques. Il s'agit de premières manifestations qui suggèrent la présence d'un groupe néolithique pastoral dans cette région montagneuse (alt. + de 1000 m).

Un autre abri inédit, situé à la sortie nord-est du village, pas loin de Tala sidi Bes3a et près d'un chemin qui mène vers le village d'At Sidi Amer, pourrait fournir la solution à notre énigme.

Mots-Clés: Mots clés : Anthropomorphes, Ihatoussene, gravures, abri, néolithique, zoomorphes

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THE ARCHAEOLOGICAL RESCUE FOR ROCK ENGRAVINGS IN ARID ENVIRONMENTS

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Rock art being a vulnerable element and constituting the graphic testimony that has arrived from the oldest groups established in the Mexican territory to historical moments; both are reasons why its conservation and preservation is inescapable. The first step in thisdirection is the Registry, considered as a knowledge and documentation tool, through which the information capital is preserved constituting a mandatory database for decision making and from which the protection and conservation measures will emanate. A special type of record is the one that emanates from the archaeological rescue works in which neither the design of the project nor the time allows an integral planning for the study of rock art. In this intervention we propose an action protocol, which goes through the location, the observation of the content for the filling of the identification card designed for this purpose based on three variables, the rock patina, the technique used to draw the engravings and the types represented and finally the digitalized reproduction. Rock art is an archaeological element sensitive to both natural and anthropic deterioration, the natural damage in this case is due to climatic and environmental factors that produce drastic physical-chemical changes, especially in the desert or semi-desert areas associated with the northern region of the country and the anthropic is infrastructure works (communication roads). This protocol has been applied in San Rafael de los Milagros, Coahuila, Northeast Mexico, site located in the semi-desert region of northeastern Mexico with a high index of pillage and deterioration.

Mots-Clés: Rock Art, Arid Environment, Mexico

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”Archaeology of light": an essential approach to understanding the Palaeolithic Cave Art.

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The earliest and most reliable data of "paleospeleology", that is, the presence of ancient humans in deep caves has been related to Neanderthals. In the Upper Paleolithic, the combustion residues related to the lighting are proliferating in the inner of the caves, especially associated with paleolithic graphic activity in this dark context. However, the archaeological research here has focused on the preferential analysis of a singular kind of subterranean anthropic evidence: the Paleolithic Art. The analysis of the Internal Archaeological Context (where the remains of the paleolithic lighting system would be included), began on the second half of the 20th century. Yet, this subject is currently growing and it is beginning to be addressed in a holistic and interdisciplinary way for the global knowledge of the paleolithic anthropization of caves.
The study of paleolithic lighting is essential to apprehend the symbolic human behaviours that occurred in the darkness of the caves. Lighting is a *sine qua non* resource used to enter the underground environment and its physical characteristics (duration, intensity, gas secretion, ...) determine human actions carried out inside the caves strongly. Currently, there is an ideal study framework to delve into this topic, thanks to the comprehensive and interdisciplinary approach which the underground contexts are being faced with. Likewise, the improvement of various microscopic and physical-chemical analytical observation tools provides a promising context for this incipient subject of study, occasionally including traces of difficult detection.

We will present a synthesis of the doctoral thesis developed by the first author, as well as some new research on this topic. Specially, the results from **Atxurra cave (Bizkaia, Spain) and Nerja cave (Málaga, Spain)** will be presented.

The *Archeology of Light* combines a methodology interdisciplinary and it includes the surveying and integral cataloguing of the combustions remains, the archaeological-spatial study of them through G.I.S., the anthracological identification of the charcoals, from the taxonomic, taphonomic and dendro-anthracological aspects; the characterization of the different phases of prehistoric use and occupation of the internal zones of these deposits through the 14C-AMS dating of the charcoals and the management of radiocarbon results with Bayesian statistics; together with other complementary analytics, especially those of physical-chemical nature, for optimal identification and study of the different remains of combustion/lighting of the endokarstic context. Also, the methodology includes an Experimental Archaeology section where we present

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qualitative and quantitative results on the light characteristics of prehistoric lighting systems.

All in all, this study has allowed us to advance in the knowledge of the activities developed by the prehistoric groups in the underground environment, beyond the work directly linked to the execution of Paleolithic Art, and especially about the different pyrotechnic solutions used in the underground environment. In addition, the main conclusions confirm that the prehistoric anthropization of the endokarst is heterogeneous and multifunctional, that it has an important cross-cultural nature and that responds to generally planned actions, such as those related to the selection and provision of certain woody fuels or the location of the systems of light in the cave.

Mots-Clés: Lighting, Paleolithic Cave Art, interdisciplinary

Spatial distribution and composition of the desert varnish in the Arroyo de Las Flechas rock art site (Caborca, Sonora, Mexico)

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In recent times, the possibility of dating engravings by studying the varnishes that form on their surface has been considered. A preliminary study of the varnishes found in the archaeological site of El Arroyo de las Flechas in the Sierra de El Alamo (Caborca, Sonora, Mexico) is presented here. These groups of petroglyphs are carved on rocks with a dark patina, known as desert varnish. Their chronocultural contextualisation establishes these representations within the pre-Hispanic culture of the Trincheras Tradition. However, the patination of some figures may indicate different chronologies. Therefore, we have analysed the spatial distribution of the panels along the stream to determine whether there was a preference on the part of the authors to engrave on particular rocks. In addition, we carried out thin lamination studies of the varnish to determine its mineralogical composition. The iconography present, the analysis of the colour of the patinas and their geochemical composition can provide us with a great deal of information. This information is not only related to when the engravings were made, but also to what the environment was like at the moment of their formation, i.e. the palaeoenvironmental restitution.

Mots-Clés: Rock art, Sonora, petroglyphs, desert varnish, palaeoenvironmental restitution

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Nouvelles étude sur le site rupestre d'Azru Imeyazen Tarihant (Kabylie)

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L'existence d'un art rupestre en Kabylie est connue depuis plus de soixante ans et les inscriptions libyques peintes de la région d'Ifigha, signalées dès 1900, furent publiées par A. Boulifa en 1909[1]. Actuellement, 54 stations sont connues, et la plupart d'entre elles furent découvertes par R. Poyto et J.-C. Musso[2]. On les trouve dans des abris, sur des rochers et des blocs de grès de la partie Nord de la Kabylie. Elles comptent quelques gravures sur dalles et sur parois, et de nombreuses peintures conservées sur les parois des abris. On y reconnaît quelques silhouettes humaines et animales, généralement très frustes, des tracés linéaires, des bâtonnets, des pointillés, des ovales, des croix, des rectangles cloisonnés et des caractères libyques en nombre important. La peinture utilisée est l'ocre rouge naturelle. Tarihant est l'un de ces sites et l'on y signale cinq abris : Azru T'zizwa, au nord, Azru Allal, Tamda u Qelwac, Azru Uzaghar etenfin le site le plus riche Azru Imeyazen au sud.
L'objet de cette recherche est une analyse plus poussée de ces peintures et leurs significations. Le choix s'est porté sur le site d'Azru Imeyazen pour les raisons suivantes :

La richesse de ce site en peintures rupestres;

La menace de disparition de ces peintures.

La sensibilisation de l'instance concernée pour une meilleure mise en valeur de ce potentiel archéologique et historique.

Boulifa , S., Notice sur l'inscription libyque d'Ifigha , Revue archéologique 4 /XIV , Paris , 1909, p. 411

Poyto, R., Musso , J.C., Corpus des peintures et gravures rupestres de la Grande Kabylie , Mémoires du centre de recherches antis, Anthropologiques , Préhistoire et Ethnographiques, t. XI (Art et Metiers Graphiques) ,Pari9s, 1969, p. 44, 6

Mots-Clés: peintures rupestres, Azru Imeyazen, Kabylie

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SG: PRE-ROMAN, MIDDLE AGE & PRE-COLOMBIAN SOCIETIES

Nouvelles acquisitions sur la dynamique de la pénétration minoenne-mycénienne dans le centre-ouest de la Sicile.

Mes nouvelles découvertes, sur un territoire qui n'a jamais été étudié, ont donné une lecture différente de la préhistoire sicilienne avec l'acquisition de nouvelles données importantes sur la pénétration de la colonisation et du commerce minoen et mycénien dans le centre-ouest de la Sicile. La grande ville de Montagna Vecchia, sur le territoire de Corleone, présente des composants typiquement mycéniens et était située le long de la route reliant Palerme à Agrigente qui reliait la côte sud au nord. C'était déjà la voie commerciale la plus importante de l'île, car elle représentait une portion de la longue route commerciale nord-africaine / sud-française de la période campaniforme à travers la médiation des îles de la Sicile, de la Sardaigne et de la Corse. Il y a des années, il semblait que cette colonisation s'était arrêtée dans le sud-est de la Sicile, mais ces nouvelles découvertes ont changé cette donnée et nous ont donné la confirmation que le peuple minoen-mycénien s'était rendu même dans le centre-ouest de la Sicile avec une importante présence permanente. Certaines zones de destination sacrée probable ont également été identifiées, étroitement liées à la colonisation hellénique ultérieure de la Sicilie.

Angelo Vintaloro

”Inanna’s Game": The Emergence of War and Social Complexity in the Ancient Near East.

Mark Schwartz * [1]

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The connection between warfare and the development of social complexity in the Near East is a topic of much debate among archaeologists and anthropologists. Some scholars see warfare as important in the rise of the earliest civilizations while others have held that large-scale warfare was more of a consequence than a cause of the development of early states. The nature of war and its’ causes are different in small-scale societies than they are in larger more socially stratified ones. This paper will present some of the evidence for warfare in the ancient Near East through time and offer interpretations of larger cultural patterns.
Warfare was not simply a struggle for survival brought on by desperation or a response to climatic fluctuations. While many assume that population growth and resource scarcity would be the most obvious causes of warfare, archaeology, ethnography, and history shows that wars are also waged not out of necessity, but a desire for more material wealth, a larger labor force, and the protection of trade interests. The possible causes of war are numerous, and not uniform across regions, or through time. Geography, climate, culture, and other factors played a role in the levels and nature of warfare in the ancient Near East but did not predetermine whether conflict between societies would arise. War may not have been inevitable or irreversible but it was self-reinforcing and once conflict emerged it progressively led to greater and more frequent violence. Warfare became embedded in the ideology of rulership in many Near Eastern societies. The more we understand the origins and causes of warfare in the past, the better able we will be in developing ways to reduce the levels of conflict in the present.

Mots-Clés: Warfare, Social Complexity, Conflict, Mesopotamia

*Intervenant

A Mercurial Connection: How cinnabar and quicksilver shaped the ancient Maya and Highland Mexico relations

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Although controversies continue to arise and evolve over the mercurial nature, and routes of exchange that influenced the unpredictable relations between the ancient Maya and Highland Mexico, particularly with the metropolis and ritual center of Teotihuacan, it is clear that both areas placed tremendous importance on the use of shiny objects such as jade, obsidian, and pyrite mirrors in their rituals. Reflective liquid mercury or quicksilver, a medium most likely used for scrying, was derived from the vibrant red mineral cinnabar. Cinnabar embodied the blood and heat of life and was employed in Maya accession and burial ceremonies throughout Mesoamerica to animate objects, painted murals, and the dead since Preclassic times (100–250 CE). This paper will track how the procurement and uses of the enigmatic mineral and its liquid form sheds fresh light on its significance as a magical substance with an esoteric meaning in this complex dynamic of the ancient past.

Mots-Clés: Mercury, scrying, cinnabar, Maya, Teotihuacan

*Intervenant

The Greatest Slave Revolt of the American Southwest

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Abstract: In the spring of 1680, the Pueblo Indians of New Mexico devised an audacious plan of liberation. They would rise up on the same day and kill all its friars and civil authorities, burn down its churches, destroy its Christian images and rosaries, and unmake all Christian baptisms and marriages. In one decisive coup, these Natives would erase most traces of the Spanish presence in the region. Although many scholars regard the Pueblo Revolt of 1680 as unique and extraordinary, it actually belongs in a large canvas of indigenous insurrections that rocked Mexico and the American Southwest in the sixteenth and seventeenth centuries. This presentation will examine how the semi-agricultural and hunter-gathering inhabitants of this large region initially pledged allegiance to the Spanish Crown and, at least nominally, became a part of the empire. But with the passage of time, they came to reject the colonial regime and its coercive labor practices and ended up resorting to all-out rebellion to survive.

Mots-Clés: slavery, captivity, rebellion, Native Americans, early colonialism

*Intervenant

Origins of horse saddles: insights based on rock art examples from Philippi (Greece) and Jebel Rat (Morocco)

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In what concerns the rock art of Philippi (Kavala, Greece) the present paper is the result of fieldwork where the author participated as researcher and member of the scientific committee of the Hellenic Rock Art Centre (HERAC) in 2005 and 2006 and as supervisor of a PhD thesis by a Greek archaeologist in 2010, in the frame of a different project, being, so far, the theme of these saddles still understudied.
Regarding the rock art from Jebel Rat (High Atlas, Morocco), this paper follows insights from the result of an iconographic analysis of the figures studied by the colleague Alessandra Bravin in the sequence of the elaboration of her recent PhD thesis, following also this author's arguments in what concerns chronological issues.

The rock art of Philippi is characterized by many representations of Iron Age warriors on horseback exhibiting weapons. In some cases it is also possible to observe what seems to be the representation of saddles with a diverse typology (semicircular, triangular and quadrangular). The author presents a *corpus* of the several examples of saddles discovered so far at Philippi and proposes a preliminary chronological approach based on crossed information from different sources. He also argues about the need of using structured saddles by archers in order to perform the so called Parthian-shot, which can be seen in diverse examples among the rock art figures from this region.

In a similar way with Philippi, the rock art of Jebel Rat has many representations of horse riders using weapons, existing also several examples of the depiction of saddles. However, most of the cases observed here are more schematic than at Philippi, consisting only in two vertical or short inclined lines, mentioned in the literature as "Roman saddle". However, in this region there also examples of saddles of a different typology, constituted by the representation of two arches which, according to Bravin's arguments, are earlier than the other mentioned cases.

The representation of saddles at Philippi and at Jebel Rat helps to clarify the problem of the origin of these devices, which literature has been attributing to a unique focus of origin – the Asian steppe during the 5th century BC. In the light of recent research based on the iconography of horse riders in the East Mediterranean, which appears on pottery dated from Late Bronze

*Intervenant

Age, it looks plausible that horse saddles had multiple focus of origin, in a similar way of the research regarding horse domestication, which recently has been discarding the idea of a unique focus of origin in Kazakhstan, and accepting the possibility of independent multiple origins.

Furthermore, archaeological evidence shows cases of possible early saddles in the Eastern Mediterranean, such as a clay model of a ridding woman from Cyprus, dated from the 14th /13th century BC, and a similar example from Archanes (Crete), dated from the 11th century BC, with both riders sitting on an unambiguous structure, being fundamental to consider these examples when establishing a chronology of horse saddles.

Mots-Clés: Philippi, Jebel Rat, rock art, structured saddle, origins.

Conflict management in non-state human societies. The example of the Kurdish social organization as an aid to data on pre and protohistoric societies

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Organized violence inside and outside groups is witnessed in Europe since the Early Neolithic (VI millennium BC) and is increasingly regularized in the Copper Age (III millennium BC) with the rise of warriors recognized as such by their people in their status symbol (Bell Beaker Culture) and with the appearance of the first objects conceived and produced exclusively as weapons (swords) in the Bronze Age (2nd millennium BC). Precisely in the Late Bronze Age (1300-700 BC), hillforts have also appeared systematically for the first time overall in Europe, which mark the will of each human group not only to identify themselves in a territory to be defend, but also to underline the presence of a strong local power. For all these periods, however, there are no state-owned societies, with central power able to organize for the conflict an entire territory concerning more territories, but societies that go through increasingly complex phases of chiefdom or an autonomous political unit that includes a number of villages or communities under the permanent control of a leader. Archeology has a lot of material data available, but to summarize archaeological data needs still current examples of political units of today which are not organized as a state but which are managed by leaders. The Kurdish people have about 45 million individuals, spread over a large territory politically belonging to 4 states, Turkey, Syria, Iraq and Iran: the cultural and political fragmentation and persecution has not completely quelled a strong common cultural matrix, very ancient and extremely rich and characterized, stubbornly handed down for a large part as a cultural heritage passed down orally. In rural areas there are still pockets of cultural resistance, especially where the established power (the State is also geographically more distant, where the management of community life and the inevitable conflicts of different kinds still takes place following the unwritten laws of tradition, in to which the decisive word belongs to the council of elders and the word has the value of the legal seal. The example of the Kurdish political organization can be a good ethno-archaeological comparison for

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understand several problems to protohistoric societies.
The work consists in giving a view of the panorama that we have of pre and pre-historic societies organized in chiefdom through materials and contexts in the warfare field, to compare them with the non-state political organization of the Kurds today and to try to give an idea of organization of the conflict in ancient non-state societies.

Mots-Clés: Non state societies, Protohistory warfare, Kurds, etnoarchaeology

LES STRUCTURES ROUTIÈRES NON FORMELLES DANS LE SUD DU BRÉSIL

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Le but de cette communication est de présenter des données sur les structures routières non formelles existantes dans le sud du Brésil : les chemins, les sentiers, des constructions bordures, pavés, murets, etc.
En ce sens, il existe plusieurs exemples de structures routières, telles que le Chemin des Troupeaux, l' ancienne route Três Barras, le Chemin Desterro-Lages, parmi d'autres existants dans l'État de Santa Catarina, ansi come dans le Sud de Brésil.

Ces routes ont conduit au déplacement des hommes, des animaux et des marchandises, reliant différentes régions du Brésil, et étaient des vecteurs de communication et de formation des villages, qui ont donné lieu plus tard aux villes.

Le Chemin des Troupeaux a été étudié à l'aide de différentes sources et de propositions méthodologiques autout de l'archéologie du paysage pour identifier, cartographier et comprendre les structures routières qui subsistent aujourd'hui.

Mots-Clés: Routières non formelles, les structures routières, le sud du Brésil

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THE EVOLUTION OF RELIGION FROM THE DAWN OF HISTORY TO PRESENT TIMES: A PARALLEL OF RITUALS BETWEEN ANCIENT EGYPT AND CHRISTIANITY

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Archaeological evidence provides abundant information about religious rituals during Prehistory and Protohistory in Ancient Egypt. Graffiti and paintings are the main source for evidence of these rituals, gestures and offerings to the gods.
This research deals with the resemblance of that evidence with the actual rituals and gestures used at present times in Christian religions, specifically during the Catholic Mass. Public participation was mainly restricted during Ancient times, unlike in the present, where the public attending are encourage to be also participants.
In Ancient Egypt, the priests and the king himself were the closest link to the gods, with sometimes participation of the royal family, as seen on Amarna depictions. Today it would be unthinkable to have Mass without the participation of the attending public. The same participation is expected today in the distribution of the sacraments and last rituals performed at the death bed.
Rituals performed in Ancient times were spoken in the colloquial language, but later on, the rituals evolved in a way that the languages used by the priests performing the ceremonies differed from the common language spoken by the people. In this way Aramaic, Hellenic and Latin were the evolving languages of the present day Catholic rituals, culminating in a vernacular custom of the country where the rituals are today celebrated.
Different types of clothing and paraphernalia were also part of the Ancient rituals as it is today in the diverse countries where the Catholic Mass is celebrated. An investigation and a study of these rituals compared to the archaeolical evidence of the dawn of History in Ancient Egypt, will be examined here.

Mots-Clés: Religious evolution Religious rituals in Pre, Proto History Ancient Egyptian Religion Catholic Mass

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Mans of War? Erhnoarchaeological Approaches to descriptional categories of „actors of violence"

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What makes a man a man - this question is not obly raised in a popular german song of the 80s, but also in current gender archaeology.
But going further, we easily can ask a similar question about descriptive topics in the field of violence. Warrior, fighter, man of war. - What do those categories mean, what do they summarize and which words are really usable in archaeological contexts?

Refering to examples from ciltural anthropology, the planned talk ainms to build up a helpfull sketchbook for both sciences, ethnology and archaeology, combinig their past perspectives.

Mots-Clés: Warrior, Fighter, Violence, Ethnology, Archaeology, Cultural Anthropology, Theoretical Concepts

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SG: MARINE RESSOURCES: FOOD AND BEADS

gestion et sauvegarde des sites malacologiques de la basse Casamance (sud du Sénégal)

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Résumé

La région de la basse Casamance, n'avait pas porté beaucoup d'attentions pour les recherches archéologiques. Les fouilles de huit amas coquilliers dans le delta du fleuve Casamance par Sapir Olga Linares de Sapir (1971), dont les plus connus Niomoune et Samatite ont permis de découvrir des occupations humaines de l'âge du fer, les plus anciennes à ce jour en Casamance. Elles ont mis en évidence la présence de restes de tessons de céramique, de mollusques, d'ossements d'animaux et d'artefacts en fer datés par la méthode radiocarbone à 200 av. J.-C.

Cependant ce passé est méconnu par la population locale et aucune mesure de prévention n'a été prévu pour la sauvegarde de ses sites.

Si la récolte des huitres est une activité ancestrale en Casamance, elle est aujourd'hui réservée aux femmes. Elle a pendant longtemps constitué un complément alimentaire, mais aussi une source de revenus d'argents, car les produits étaient vendus dans les marchés nationaux du pays. Toutefois, cette activité tend à disparaitre du fait des changements climatiques (disparition des mangroves liée à la salinisation des sols ; difficultés à écouler les produits à cause de l'enclavement). La pêche qui fut une activité complémentaire de subsistance à moindre effort dans les petits *bolons* est devenue difficile, car il faut pratiquement aller en haute mer pour pouvoir capturer du poisson.

Les enquêtes de terrain que nous avons effectué dans certaines iles ont permis non seulement de comprendre l'importance de la récolte des mollusques chez ses populations, mais aussi l'inquiétude liée à la raréfaction des ressources halieutiques.

Mots-Clés: sauvegarde, faune marine basse Casamance, Protohisroire

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Activités agricoles et exploitation de coquillages: deux méthodes de destruction des nécropoles du delta du Saloum, Sénégal

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Résumé

Inscrit sur la liste du patrimoine mondial de l'UNESCO en juin 2011, en raison de son paysage singulier, à la fois naturel et culturel, le delta du Saloum abrite des sites archéologiques d'âge protohistorique connus sous le nom d'amas coquilliers sur lesquels, s'observent des tumuli. Estimés à 903 (Thilmans et Descamps, 1982 : 43), ces nécropoles subissent depuis quelques décennies une exploitation sévère et non contrôlée, occasionnant ainsi leur destruction imminente ou progressive. Pour des soucis culturels et patrimoniaux, nous cherchons, à travers ce travail à faire connaitre la situation destructive actuelle de ces centaines de nécropoles à des fins agricoles, domestiques et/ou économiques. En effet, pour les populations du delta du Saloum, les nécessités agricoles, économiques et domestiques, priment d'abord sur l'intérêt culturel et patrimonial.

Nous préconisons ainsi une interdiction formelle et rigoureuse de l'exploitation des amas en proposant aux populations des activités plus rémunératrices. Une collecte générale de la culture matérielle archéologique découverte lors de l'exploitation des tumuli ; la création d'écomusées, pour la conservation de ces vestiges, et enfin une protection et une surveillance régulière des sites, doivent aussi être envisagées contre d'éventuelles menaces anthropiques ou/et naturelles. Ces perspectives vont dans le sens de la préservation des nécropoles et de la conscientisation des populations du delta du Saloum.

L'objectif principal de ce papier est d'inciter les autorités politiques et administratives à prendre conscience des menaces de disparition définitive des tumuli coquilliers, afin d'apporter des solutions convenables face aux pillages des nécropoles.

Mots-Clés: Tumili, nécropoles, coquilles, amas coquilliers, patrimoine

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Les observations et études stratigraphiques et archéologiques dans l'est et le sud-est du Sénégal

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Les premières observations stratigraphiques et archéologiques (entre 1983 et 1990) dans l'est et le sud-est du Sénégal, avaient permis de confirmer une identité de l'évolution chronostratigraphique de la basse vallée de la Falémé, au Nord, et de la moyenne vallée de la Gambie, au sud, dans la zone du Parc National du Niokolo Koba et de la région de Kédougou.
Une échelle chronostratigraphique (Camara A. et Duboscq B., 1984)[1] offrant des datations relatives a été proposée pour les outillages préhistoriques a été obtenue à partir:

- des données comme celles climatiques, tirées de l'étude des carottes marines effectuées au large de la Mauritanie, et plus particulièrement des travaux de D.W. Parkin et N.J. Shackleton, 1973[2] sur la carotte V-23-100 et ceux relatifs à la carotte 13289 présentée par M. Sarnthein et *al,* 1982[3] ;

- des données climatiques et des données de la morphogenèse résultant des trois grands phénomènes qui modèlent le paysage quaternaire de l'Est et le Sud-Est : le creusement, le comblement des vallées et l'altération des roches (P.Michel, 1973)[4].

Depuis 2011, des études plus systématiques ont été reprises le long de la Falémé, permettant de mieux affiner la stratigraphie des formations sédimentaires (Rasse M. et *al*, 2019)[5] et confirmant le potentiel préhistorique de la vallée. Des datations OSL ont été effectuées permettant un meilleur suivi de la chronostratigraphie d'ensemble (Lebrun B, 2018)[6].

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Mots-Clés: Chronostratigraphie, datations, formations sédimentaires, géomorphologie, industrie lithique, paléolithique

Archaeomalacological investigations at Barrosinha, a Neolithic shell-midden in the Sado estuary, Portugal

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Barrosinha shell-midden is at Comporta, on the southern bank of the Sado estuary in Portugal. It is a large open-air site located on top of a dune, which was explored in 1979 by two of the researchers (Joaquina Soares and Carlos Tavares da Silva), with a very high density of marine or estuarine fish and invertebrate remains. In 2017, a team directed by Pablo Arias re-excavated the site and obtained new samples from two pits, named Pit 1 and Pit 2. In this communication we present the preliminary results of our investigations in Pit 2. It focuses on the characterization of the intensive exploitation of marine or estuarine shellfish (mainly the grooved carpet shell *Ruditapes decussatus*, but also the mussel *Mytilus* sp. and the grooved razor shell *Solen* sp.), as well as of the presence of freshwater (e.g. *Peringia ulvae*) and terrestrial (e. g. *Theba pisana*) gastropods documented in the Neolithic stratigraphic units of the shell-midden.

Mots-Clés: Archaeomalacology, Neolithic, shell, midden, Sado estuary, Portugal

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THE MANAGEMENT OF MARINE RESOURCES IN THE TRANSITION FROM THE UPPER PLEISTOCENE TO THE HOLOCENE IN THE NERJA CAVE (MALAGA): THE CASE OF THE GASTROPODS OF THE GENUS PATELLA.

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The Nerja Cave, located on the coast of the Alboran Sea, has documented one of the few stratigraphic sequences in the Western Mediterranean, where the transition from the Upper Pleistocene to the Early Holocene has recorded. The proximity of the site to the coastline makes the Nerja cave a key settlement in the study of the management of marine resources by past societies. The archaeological interventions carried out by Professor Francisco Jordá Cerdá, between 1979 and 1987, in the Sala de la Mina, provided levels with abundant malacological remains dated to the late Upper Magdalenian period between 12.300 and 11.900 cal BC (levels XVI, XV and XIV), the Geometric Mesolithic between 6200 and 6000 cal BC (levels XIII, XII and XI), the Middle Early Neolithic between 5300 and 5100 cal BC (levels X, IX, VIII, VII and VI) and

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the Resent Early Neolithic between 5050 and 4900 cal BC (level V). Archaeomacological studies show the continuity of marine mollusc harvesting practices between the Late Upper Pleistocene and Middle Holocene. This paper presents, on the one hand, the taxonomic, quantitative and biometric analysis of the specimens of the genus Patella, the most abundant gastropod at the site, and on the other hand, the results of the seasonality study based on the analysis of stable oxygen and carbon isotopes of the shells of the species Patella caerulea from the Nerja cave. The aim is to determine the management of marine molluscs by the last hunter-gatherer and early Neolithic societies, and whether there was a change in the exploitation strategies of this marine resource between 13,000 and 6,000 cal BP in the Western Mediterranean.

Mots-Clés: Western Mediterranean, The Nerja Cave, seasonality study, Patella caerulea.

Facebooking the Past: Modelling maritime social networks in the Eastern Adriatic

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Social networking has become a widely used term in modern times due to online tools such as Facebook or Twitter. However, to an archaeologist – social networks are at the core of their research. Finding correlations, cultural influences and addressing questions reconnecting socio-economic networks from the past by looking at fragmented material evidence, has always been one of the main driving forces of archaeological research. Despite that, Social Network Analysis (SNA), a well-established method in social sciences, is still at an incipient stage regarding theoretical application to archaeology. This paper presents a maritime network model as a potential instrument to reconstruct the colonisation of Eastern Adriatic islands by integrating spatial and non-spatial patterns of cultural connectivity. The paper will use two comparative sets of data – the maritime Neolithisation process and the Greek maritime colonisation of the Eastern Adriatic islands. Assuming that the information about the Greek expansion process is more detailed, this study intends to highlight the patterns described by Greek maritime mobility in the Adriatic. The Greek connectivity model will be used as a proxy for Neolithisation, helping to create a more accurate and reliable Neolithisation model. Ultimately, the Neolithisation model will allow a better visualisation of the flow of material goods, information, power, influence, and social control. Furthermore, this process will analyse the ancient Mediterranean maritime landscape not just geographically but also socially.

Mots-Clés: Neolithisation, Eastern Adriatic, social network models, Greek colonisation

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New evidence of personal ornamentation in the Epipalaeolithic of Central Asia

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Personal ornaments, made of various organic and mineral raw materials, represent an essential element of cultural assemblages among the early occupants of Central Asia. Previously, many ornaments from this territory were identified from archaeological sites without radiocarbon dates or surface assemblages with problematic context. As a result, traditions of manufacture, raw material selection, and use of these items – along with their complex social, cultural, and aesthetic functions – have gone unnoticed or unstudied. Here we analyze the new findings of personal ornaments obtained during the excavation of four stratified archaeological sites of Central Asia: Obishir-5 and Surungur in Fergana Valley, Aigyrzhal-2 in the Central Tien Shan, and Oshhona in Pamir mountains.

The oldest evidence of symbolic activity for the low-mountain area of Central Asia occurs in the Fergana valley in the Early Holocene layers of the Obishir-5 site (10.8–8.2 ka cal BP). The Obishir collection includes one pendant made of a Canis tooth and five artifacts made of talkite, serpentinite, and marble, produced through grinding and drilling. The stone ornaments are ovoid, subtriangular, and subrectangular pendants, a labret-like item, and a pendant blank. For the manufacture of stone ornaments, inhabitants of the Obishir-5 used raw material transported to the site over a distance of 4.5 km. At the Surungur site, there is one elongated bead made of the diaphysis of tubular bone (_˜9,5–8 ka BP). In the highlands of Central Asia, the earliest evidence of personal ornaments occurs from the Aigyrzhal-2 site (13.4–13.0 ka cal BP). The pendants made of a Cervus incisor have a curved profile and circular cut-marks in the root. At the Oshhona site, five bone ornaments occur from this stratigraphic unit dated to 7,6 ka cal BP. This collection includes two pendants with perforations made of the Capra/Rangifer tubular bone and an Ovis/Cervidae/Saiga tooth, two elongated beads made rabbit/leporid, Felidae, and Murida tubular bones.

Our research shows that in the Early and Middle Holocene period in Central Asia, a tradition of personal ornament production already existed in a developed form. Applying use-wear analysis and experimental data, we reconstructed the main techniques for manufacturing beads and pendants at the Obishir-5, Surungur, Aigyrzhal-2, and Oshhona sites. Our research demonstrates that cultural adaptation to the diverse environments of Central Asia manifested in the selection of raw materials for personal ornaments, which appear consistently at Early Holocene sites from lowland territories to high mountain zones across the entire region. Comparison of the personal ornaments from Fergana Valley, Tien Shan, and Pamir with collections from other areas

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of Central Asia dating to this period indicates that locally-available raw material was primarily selected for the production of non-utilitarian items, leading to regional differences in the use of bone, stone, and shell between high elevation and lowland areas.

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Mots-Clés: Central Asia, Epipalaeolithic, Personal ornaments, Use, wear analysis, Technological analysis

Big things come in small packages - Columbella rustica as a Mesolithic ornamental tradition in the Eastern Adriatic Coast

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The Eastern Adriatic territory yielded many prehistoric sites, although many of them are underwater due to the sea level rise. The Preboreal (11,700 - 11,000 cal BP) was a time of rapid sea-level rise in the Adriatic region, a phenomenon that continued during the Boreal (11,000 - 9000 cal BP) with the sea levels rising from -41.5 m to -10 m between 9200 BP and 7800 cal BP. The production of beads is well documented during the Mesolithic across the entire Eastern Adriatic region. In particular, at the sites of Pupićina cave, Abri Šebrn, Nugljanska cave, and Lim 001 in Istria, Vela cave on the Lošinj island, Zala cave in Lika region, Vlakno cave on Dugi otok island, and Vela spila cave on the Korčula island, marine gastropods (*Columbella rustica, Tritia neritea, Nassarius* sp.), freshwater gastropods (*Lythogliphus naticoides* and *Theodoxus danubialis*), and animal teeth (*Cervus elaphus* canine) were selected as raw material for the production of ornaments.
To date, the largest collection of ornaments in the Eastern Adriatic area comes from Vlakno cave. At this site, most of the beads were made of marine gastropod *Columbella rustica*. In this paper we present the results from the technological and use-wear analysis carried out on the ornament assemblage from the Holocene levels (Strata 2 and 3) of Vlakno cave. In particular, we examined perforation techniques on *Columbella rustica* beads through a novel combination of (1) experimental archaeology, (2) technological and use-wear traces analysis and (3) geometric morphometrics. The identification of distinct perforation shapes and use-wear patterns on the archaeological specimens, allowed us to reconstruct the specific type of percussion technique used for producing shell beads at Vlakno cave. Moreover, the analysis of archaeological shell ornaments highlighted (a) a conspicuous amount of beads without traces associated to use; (b) the presence of numerous specimens with fractures interpreted as manufacturing accidents; and c) the presence of numerous unmodified *Columbella rustica* shells, evidence so far recorded only at Vlakno cave.

Based on such data, we discuss the possibility that during the Mesolithic Vlakno cave might have acted as a location for the acquisition of *Columbella rustica* shells and their transformation into ornaments to be distributed across the wider Adriatic region. The existence of specific patterns of raw material selection for the production of ornaments identified at Vlakno cave suits

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the wider ornamental choices documented for the region, suggesting the existence of wide social networks based on shared modalities of social identity and personhood construction during a time of uncertain environmental upheaval.

Mots-Clés: Mesolithic, Eastern Adriatic, ornaments, experimental archaeology, technological and use, wear traces analysis, geometric morphometrics

The Late Pleistocene mollusk sample from Contrebandiers Cave (Temara, Morocco): marine resource exploitation and personal ornaments

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Increasingly, researchers have considered the role of coastal marine resource exploitation in influencing the trajectory of human behavioral and biological evolution, specifically relating to modern human origins. However, these models have focused almost exclusively on the relatively rich and well-documented record from the Middle Stone Age (MSA) of coastal South Africa. Here, we present data on coastal marine resource exploitation and ornamentation during the Late Pleistocene at Contrebandiers Cave [La Grotte des Contrebandiers, Smugglers' Cave] (Temara, Morocco). Contrebandiers' sequence includes the MSA, which spans _~126,000-90,000 years ago at the site, and the Iberomaurusian, which elsewhere is _~23,500-12,500 years ago. Today the site is only 270 m from the Atlantic shore; during the MSA and Iberomaurusian, inhabitants appeared to have had consistent access to a nearby rocky coast, where they gathered mainly marine mollusks (limpets, mussels, and marine snails) for subsistence, but also other marine fauna in small proportions (birds, fish, crabs, goose barnacles, and sea urchins). The Contrebandiers occupants also collected during both the MSA and Ibeuromaurusian shells for non-dietary reasons; these include triton (*Charonia lampas*), but above all tick shells (n=154). Most of the tick shells belong to two different species of the Nassariidae Family: *Tritia gibbosulus* and *Tritia circumcinctus.* Neither of these two gastropods lives along the Moroccan coasts

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today, but they can be found in local fossilized beaches. We analyze the Contrebandiers sample in comparison to a sample of shells from these geological settings. The large majority of the archaeological tick shells preserve perforations, inviting us to ask if they had been used as personal ornaments, as has been argued for similar shells found elsewhere in northern Africa, as well as in South Africa. Each archaeological and geological tick shell was subject to a macroscopic and microscopic taphonomic analysis, including measuring and recording surface preservation, use-wear, and residues. Here we discuss the Contrebandiers tick shells through a taphonomic and morphometric approach that is integrated with the analysis of the mollusks exploited for subsistence and the geological sample, focusing on their potential use as ornaments.

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Mots-Clés: The Late Pleistocene, mollusk, Contrebandiers Cave, Temara, Moroc

Continuité où changement : les ornements à la fin du Paléolithique dans la région de Valence (Espagne)

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Dans la région de Valence (Espagne), il existe une relation étroite entre les stratégies techno-économiques identifiées pendant le Magdalénien et les facies micro laminaires postérieures, déjà considérées comme épipaléolithiques. L'objectif de cette contribution est de connaitre quel est l'apport des ornements personnels à la discussion sur la continuité culturelle dans la région méditerranéenne ibérique entre 18 - 11 ky cal BP.

Pour répondre à cette question, on a analysé les espèces utilisées, principalement d'origine marine, ainsi que les techniques de perforation. Les matériaux étudiés proviennent essentiellement de Cova del Parpalló (Gandia, València) et Coves de Santa Maira (Castell de Castells, Alacant). Dans tous les cas, il s'agit d'ensembles retrouvés dans des contextes d'habitation, car on ne dispose pas de données sur des contextes funéraires qui permettraient d'analyser ces objets pour mieux comprendre l'organisation sociale.

Par rapport aux périodes précédentes, on observe une perte de diversité chez les espèces de mollusques sélectionnées pour fabriquer des ornements. Dans les contextes Solutréens de Parapalló, notamment de sa phase moyenne, un ensemble nombreux et diversifié procède quant aux espèces utilisées comme ornements personnels. En ce qui concerne la fin du Magdalénien et les changements survenus dans les facies micro laminaires antérieures au Mésolithique, les données de Santa Maira permettent d'analyser pour la première fois la sélection des objets d'ornement. Il s'agit d'une information importante pour évaluer comment l'utilisation des ornements "a transité" entre la fin du Pléistocène et le début de l'Holocène.

Les données présentées dans cette étude permettent d'évaluer deux questions. Tout d'abord, s'il y a continuité tant dans les espèces de support utilisées que dans les techniques de perforation. Deuxièmement, s'il est possible d'identifier des éléments régionaux, compatibles avec la mobilité des sociétés du Paléolithique final et épipaléolithique de la région méditerranéenne ibérique.

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Mots-Clés: ornements, fin du Paléolithique, Valence, Espagne

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