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Italian-Israeli

Bi-National Workshop on:

**Environmental Constraints and the
Dispersal of the Modern Human
in Eurasia between 45,000 and 20,000 years ago.**

Organizers:

Valentina Caracuta, University of Salento, Italy.

Elisabetta Boaretto, Weizmann Institute of Science, Israel.

SESSION 1: The role of migration in the Prehistory of Eurasia

Chairman: Italo Muntoni, *Soprintendenza archeologia, belle arti e paesaggio BAT e Foggia, Italy.*

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

Stefano Benazzi

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The time period between 50,000-40,000 years ago is a crucial event in human evolution, as the so-called anatomically modern humans expanded out from tropical areas into Eurasia, replacing or partially absorbing local archaic humans, among which were the Neandertals. To date, the time and mode of this major global replacement of populations remains unknown. Within this context, new evidence places Italy as a keystone region in answering questions surrounding this transition due to its geographic position, ecological variability, and the key archaeological sites representing Middle-to-Upper Paleolithic cultures, yet Italy has largely been absent in the research. In this talk, I'm going to present a recently obtained ERC Consolidator Grant (n. 724046 - SUCCESS) that tackles this issue. It aims to understand when AMHs arrived in Southern Europe, the biocultural processes that favoured their successful adaptation and the final cause of Neandertal extinction.

The site of Uluzzo C and its place in the peopling of Southern Europe from *Homo sapiens*: new data and perspectives”.

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The peopling of Italy from modern humans is a crucial debate to understand the timing and dynamics of the *Homo sapiens* spread out of Africa. In fact, for the current knowledge, the first European *Homo sapiens* were found in Apulia. In the need for new models concerning the biological and cultural modalities of this migration, it is crucial to obtain new data from the sites yielding a sequence encompassing the so-called “Transition”. The Site of Uluzzo C, located in the Uluzzo Bay (Nardò, Lecce), has been originally excavated in the '60 and it is now object of new investigations in order to re-assess its place in the frame of this debate. The site offers the possibility to analyze the complete archaeological sequence going from Mousterian to the end of the Upper Palaeolithic, in the same locality that gave the name to the Uluzzian, the first lithic industry now associated with *Homo sapiens* in Europe. In this paper, we will present results from the ongoing excavation and to put them in the context of the Uluzzian debate.

Our flat, marshy land: a reappraisal of the human's presence in the north-adriatic plain during the Upper Palaeolithic.

Marco Peresani

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Human peopling during the early and mid-part of the Upper Palaeolithic in the northern and northeastern fringes of the Po valley is an open question since decades. Only a handful of archaeological sites have been radiocarbon-dated to this climatic phase composes a patchy archaeological record resulting, to some extent, of a lack of scientific investigation. There is little doubt, however, that the southern margin of the Po valley is characterised by a dearth of archaeological evidence, all over the Upper Palaeolithic. Furthermore, the peopling of the plain itself can only be speculated upon, as the latter is now covered by thick alluvial and marine deposits, or submerged by rising sea levels. Contacts across the area are suggested by marine shells discovered in Uluzzian and Aurignacian sites and by similarities in the early Epigravettian lithic industry of sites in north-eastern Italy, and in Slovenia and Istria. On the northeastern margin of the Po valley, in the Monti Berici, a string of caves and rockshelters with scanty archaeological remains have been investigated. The lithic assemblages are dominated by backed and/or shouldered projectile points. Dwelling structures, typological imbalance and impact scars consistently suggest short-lived campsites, a restricted set of activity, and hunting parties. Apparently, it is all what is left of a much more complex settlement system, which once possibly stretched all over the plain, with centrally located sites now deeply buried, submerged and out of reach.

The Levantine Aurignacian: A view from Manot Cave, Western Galilee, Israel

Ofer Marder

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The Upper Paleolithic period marks the establishment of modern humans, and their colonization of Eurasia. In the Levant, the Upper Paleolithic is divided into three chronological phases (Initial, Early and Late), each containing several cultural entities. The Aurignacian have long been considered the main entity in the Early Upper Paleolithic (EUP) of Europe. In the Levant, however, data on the Levantine Aurignacian is limited because sites containing well-described assemblages are few, in most cases representing restricted occupations. Techno-typological differences within and between assemblages are poorly defined and so is the chronological time span.

Eight excavation seasons (2010-2017) at Manot Cave, western Galilee, Israel, have revealed an impressive EUP sequence, ca. 2 m thick. The site presents remarkable preservation of cultural remains, containing rich flint and faunal assemblages, ash and charcoal remains, bone tools and mollusk shells. Thus far ten archaeological layers (Area E Layers I-X and Area I Layer 1-5) were attributed to the Aurignacian *sensu lato*. Preliminary analyses and field observations indicated diachronic and synchronic variation in the lithic assemblage, combustion feature morphology and archaeological material density which enables dividing the Aurignacian *sensu lato* into at least two discrete phases. In this report we will present the data accumulated on the Aurignacian of Manot and try place it in a border context of the Levantine Aurignacian as well as in the framework of the European Aurignacian.

Charcoal and Bones at the MP/UP transition: material characterization and chemical pre-treatment for timing cultural changes.

Elisabetta Boaretto

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Charcoal and bones are the most common material used for dating and have been extensively studied in relation to their suitability for radiocarbon dating. In particular for periods above 30,000 years the state of preservation is depending not only from time but also from the environment where these material were deposited. Several approaches were developed, with many of them using the obtained age as a parameter to define the quality of the material and of the date.

A different approach is to determine the state of preservation of the charcoal and test the purity of the material after the pre-treatment independently from the age.

Several examples from the southern Levant will be discussed and the effect on chronology for different procedures will be assessed.

SESSION 2: Methods to investigate technological and environmental changes during the Paleolithic

Chairman: Giuseppe de Benedetto, *University of Salento, Italy.*

Pigments in the Upper Paleolithic: contexts, method of characterization, and developments in mapping techniques on-site

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Wall paintings are an invaluable archives of materials, techniques, and artistic expressions of past civilizations, and cave paintings are an excellent example of such archives for prehistoric art. The inorganic minerals that were used for cave paintings from the upper Paleolithic in Eurasia show a palette of various iron oxides, manganese oxides and charcoal. Examples from El Castillo, Fumane, Chauvet and Lascaux show that conducting pigments analysis should be accompanied with conservation efforts. A new multi-spectral imaging approach for large scale non-invasive characterization of wall paintings in the archaeological site will be presented. The method analyzes stacked photos in the UV-VIS-IR as multi-spectral imaging, enabling to ascribe mineralogical interpretation to 2D images, which complements high-resolution mineralogical and structural information of pigments from X-ray diffraction and Raman scattering. Combined with portable X-ray fluorescence (pXRF) and fiber optic reflectance spectroscopy (FORS), these large scale mineralogical maps are complementary to previous documentation approaches to wall paintings that are based only on visual observations, refining cave paintings conservation strategies.

Environment and Migration: *Homo Sapiens* in the Levantine Corridor between 60,000 and 20,000 years ago The Paleoclimate Perspective

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The time interval from 60-20 ka defines the early to the late part of last glacial when the earth experienced a wide spectrum of environmental conditions. Oxygen and carbon isotopic compositions ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) and fluid inclusion δD and $\delta^{18}\text{O}$ values of accurately dated speleothems from several caves in central and northern Israel reveal very large fluctuations. Such fluctuations reflect response to extremely sharp environmental changes associated with the Dansgaard-Oeschger (D-O) warming and cooling cycles and very cold Heinrich (H) events. The most rapid transition to almost interglacial wet conditions occurred during D-O 14, at ~54 ka. The time period from about ~58 to 48 ka was favorable for human migration 'Out of Africa', owing to warmer and wetter climatic events spread not only over the Eastern Mediterranean but also over the entire Sahara region. These favorable climatic conditions during the last glacial were followed by gradual change to full dry glacial conditions, which reached their peak during H5 at ~48-45 ka and during the Last Glacial Maximum (LGM) at 20 ka. During the extreme cooling events, there was a sharp increase in vegetation-types adapted to extreme cold conditions.

The colonization of Sardinia and Sicily by anatomically modern humans and by not swimming terrestrial mammals: new data for answering old questions

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The time and mode of human dispersal into Mediterranean islands is a hotly debated question. A multidisciplinary approach combining palaeogeographical reconstructions with biological and archeological evidence is of crucial importance to acquire information on island colonization by *Homo sapiens* during the Late Pleistocene.

New evidence from Sicily and Sardinia demonstrates that, despite being present in the Italian peninsula at least from 43 ka BP, *Homo sapiens* reached the Sicily not earlier than the LGM in Sicily. During the Late Pleistocene, a submerged *Sill* in the Strait of Messina connected Sicily to Europe. Geological, stratigraphic and oceanographic data suggest that the bridge emerged for at least 1,500 years between 21.5 and 20 ka cal BP. This hypothesis is supported by a radiocarbon date on an *Equus hydruntinus* specimen from San Teodoro cave 21 ka cal BP and archaeological data suggesting that *H. sapiens* did not arrive to Sicily much

earlier than 17.5 ka cal BP. The Egadi Islands, off western Sicily, were not colonized before then either by humans or by terrestrial animals with poor swimming ability.

The hypothesis of a Mid-Pleistocene dispersal on Sardinia by hominins is questionable. *Homo sapiens* remains have been found in early Holocene deposits at Corbeddu cave and S'Orku e S'Orku respectively 8.7 and 8.5 ka BP, while further evidence is required to support the hypothesis of a presence during the LGM.

A study of a human tooth from Dragonara cave of Early Neolithic, and a reappraisal of the geological-environmental context of this site provide fresh data for debate, confirming a consolidated presence of *H. sapiens* on the island at about 7.3 ka BP.

As regard Marettimo island (Egadi archipelago, Sicily) we sampled and studied a 25 meters above sea level fossil deposit in the Tuono cave (SE coast of Marettimo). The outcrop (partially eroded) consists of reddish coarse sands not well cemented containing some bones and a deer jaw with many teeth in excellent condition. The fossils are protruding from the sand because the outcrop is eroded at the bottom of the cave by the sea. The fossiliferous sand contains also some *Patella Cerulea* shells, the fossiliferous sand are on the roof of a well-cemented continental breccia that, in our reconstruction, filled the cave when the sea level was lower than today. As regards the results we provide a radiocarbon age to the *Patellae* and a tooth the analyses gave the same age: about 8.6 ka cal BP (Late Mesolithic). At the light of the importance of this data we aged (with a different ^{14}C method, using the collagen) a second tooth. But the age was older. We are now discussing the reasons for this and we will provide a new age on last sample. We have interpreted the *Patella* shells as a food remain together with the deer tooth, and this would imply an important and novel interpretation for the history of seafaring that for the Mediterranean sea seems to have started at about 8.6 ka cal BP.

SESSION 3: The paleoecology and paleoeconomy of the human migration during the Upper Paleolithic

Chairman: Girolamo Fiorentino, *University of Salento, Italy*.

Vegetational landscapes in Italy between 45,000 and 20,000 years ago

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A number of long pollen records spanning the time interval 45-20 ka BP are available from the Italian Peninsula. They depict a rather diverse vegetation composition, reflecting a mosaic of local physiographic and climatic conditions, as well as the legacy of previous vegetation characters.

In Northern Italy, the pollen records from Azzano Decimo (Pini et al., 2009) and Lago di Fimon (Pini et al., 2010) show conifer-dominated forests with significant diffusion of *Tilia* and sporadic presence of other broad-leaved elements. The vegetation of the northern Apennines and northern Tuscany (Bertoldi et al., 2007; Ricci Lucchi, 2008) was an open pine forest, rich in *Quercus*, accompanied by *Abies*, *Picea*, and *Tilia*, together with many mesophilous trees in low amounts. In central Italy, several pollen records from volcanic lakes (Follieri et al., 1988; Magri, 1999; Magri and Sadori, 1999; Giardini, 2007), as well as from the Apennines (Chiarini et al., 2007) indicate the presence of open woodlands with significant frequencies of *Pinus* and deciduous *Quercus*, accompanied by sporadic appearances of other mesophilous tree taxa, in a steppe-grassland dominated by *Artemisia* and Poaceae. The presence of *Picea* and *Zelkova*, both currently absent in the region, is noteworthy. In southern Italy, the pollen record from Lago Grande di Monticchio (Allen et al., 1999; Allen and Huntley, 2000a,b), complemented by the marine record from core C106 (Russo Ermolli and di Pasquale, 2002; Di Donato et al., 2008) suggests a significant presence of evergreen oaks in open deciduous forests with *Abies* and *Fagus*. *Zelkova* and *Picea* were not recorded in southern Italy.

Between 45 and 20 ka, in all the Italian study sites the vegetation shows several rapid fluctuations of arboreal pollen percentages, which can be related to the millennial scale climate variability recognized at a global scale (Fletcher et al., 2010). However, the chronological control of these records is often too uncertain for a sound assignment of the forest oscillations to specific D-O events.

Microarchaeology at the Early Upper Paleolithic site of Mughr el Hamamah (Jordan). Results from phytoliths, spherulites, ash pseudomorphs and FTIR analysis

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The archaeological site of Mughr el Hamamah is dated between 45-39 ka. BP. Its archaeological record includes well preserved biological remains such as faunal bones, charred botanical remains, and also hominid remains. Thus, Mughr el Hamamah sheds new information regarding the environment and the use of natural resources during the Early Upper Paleolithic (EUP) in the Jordan Valley. The aim of this work is to increase our understanding about the use of natural resources by the first EUP hominids at the site of Mughr el Hamamah. Additionally, we want to assess the preservation of the deposit through microarchaeological analyses and to evaluate the effects of postdepositional activities.

Microarchaeological analyses were carried out including phytoliths, spherulites and FTIR analyses. The results yield important information regarding the state of preservation of the deposit, showing diagenesis in certain areas and also actual disturbance by shepherds in others. In addition, these results provide information about the management of the biotical resources around the cave, such as the use of marine resources. Phytolith analyses revealed the presence of C3 and C4 grasses as well as inflorescence phytoliths, related to a spring-summer use of the cave. Finally, it was possible to document the use of woody plants as fuel and the presence of fruit phytoliths within the microarchaeological record. Thus, microarchaeological record indicates the exploitation of marine and vegetal resources at Mughr el Hamamah. The landscape around the site was formed by open areas and wetlands. On the other hand, woody plants were preferred as fuel, and the presence of fruit phytoliths might be related to anthropic activities or natural agents.

The Levantine Corridor during the Late Middle and Upper Palaeolithic - a palaeoecological perspective.

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The dispersal of modern humans (*Homo sapiens*) from Africa to the rest of the world is a topic of lively debate. In the period between 60-30.000 years ago, when modern humans expanded out of Africa, the Levantine corridor (Israel and adjacent regions) served as a geographical crossroads for the movement of the hominins.

This period, which archaeologically corresponds to the transition between Middle and Upper Palaeolithic, coincided with environmental changes, including cooling, drying, and greater climate fluctuations over time. Despite many environmental changes, modern humans were able to expand their range over Europe and Asia. The unsolved issue concerns the manner in which modern humans dispersed across different habitats. Did they look for specific conditions, such as particular types of vegetation (grassland versus forests), or preferred temperature and precipitation ranges? Or did they just adapt (culturally or technologically) to the habitats they encountered.

The present work aims to investigate the palaeoecological conditions in the Levantine corridor ~48.000 to 30.000 cal B.P. The study is based on the analysis of charcoals collected in two prehistoric campsites, Boker and Boker Tachtit, located in the sub-arid highlands of the Negev and Manot cave, situated in the Mediterranean hilly region of the Upper Galilee. For Manot cave, the study of charcoals is combined with the analysis of stable carbon isotope ratios ($\Delta^{13}\text{C}$) to identify variations in the rainfall regime.

In the southern part of the Levantine corridor, the anthracological analysis reveals the presence of a juniper-tamarisc association around 48,000 cal BP, possibly pointing to the presence of a steppe forest on the highlands. Later, during the MP/UP transition, a new species of tree, atlantica mastic-tree, appears in the anthracological assemblage together with the juniper and tamarisc. Finally, during the EUP the Negev highlands became more 'forested' with schrelophyllus species, such as buckthorn, rotem and a deciduous type of oak spreading around the site of Boker and Boker Tachtit.

The anthracological analysis carried out at Manot suggests that the Mediterranean hills of the northern portion of the Levantine corridor was characterized by an open forest of oak and almond, between 48,000 and 30,000 years cal BP. This type of 'forest', which is different from the modern maquis that spreads in the region, was likely favored by specific climatic and geomorphological conditions.

The analysis of $\Delta^{13}\text{C}$ of modern and archaeological almond were subject to provided information on the local rainfall regime between 48,000 and 30,000 years cal BP. These analyses indicate climatic conditions during the ice age were unlike modern conditions and suggest at least two dry phases took place: a 'shorter' one, around 42,000, and one that extended over five millennia, between 36,000 and 31,000 years cal BP.

The palaeoecological meaning of macromammal remains from archaeological sites: some remarks from the Upper Palaeolithic of Southern Italy

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Bone accumulation in Palaeolithic archaeological sites is often the result of activities carried out by past hunter-gatherer groups. Characteristics of ungulate associations have been widely used as markers of past climatic changes, but interpretations may be affected by biases due to taphonomic pathway of remains: relative abundance of taxa could be influenced by taphonomic agents (humans, carnivores) and taphonomic processes, such as for instance transport of selected skeletal parts to site, destruction of bones due to gnawing, fat extraction, bone working or bone attrition due to natural processes. In case of anthropogenic bone assemblages, also cultural choices may have influenced prey representation in archaeological assemblages, distorting its palaeoecological meaning. In this presentation it will be discussed a comparison between macromammal and micromammal associations from the Upper Palaeolithic sequence of Grotta Paglicci (Apulia, Southern Italy). The stratigraphy of this site spans from the marginally backed bladelet Aurignacian to the Final Epigravettian. At Paglicci the high frequency of horse and ibex remains indicates open and dry environments during most of the Upper Palaeolithic. If on the one hand this is confirmed by the predominance of *Microtus arvalis* among small mammals, on the other the alternation between horse and ibex, which takes place during the Upper Palaeolithic, looks to be more related to variations of hunting territories. Frequency of taxa abruptly changes at 16,696-17,955 years cal. BP when wood-related ungulates increase together with micromammals that indicate a climatic evolution towards more mild and humid conditions. If a principal component analysis (PCA) is independently carried out on macro- and micromammal assemblages, the first component (PC1) describes in both cases the alternation between open environment and closed environment-related taxa. Thus, both first components are influenced by temperatures and precipitations. When trends of both first components are compared, it emerged a strong correlation ($p=4.6718E-07$) which indicates that micro- and macromammal associations give us comparable palaeoenvironmental information. It highlights how can we use zooarchaeological data as a palaeoenvironmental marker and how can we distinguish environmental-related from cultural-related changes in faunal associations.

Anatomical Modern Human Adaptations and Early Upper Paleolithic Zooarchaeology in the Levant

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Research on Upper Paleolithic faunas in the Mediterranean Basin contributes valuable information on the diet, environment and population dynamics of the first modern human groups outside Africa. The Upper Paleolithic faunal record of the Mediterranean Levant is described here in relation to adjacent areas and to previous and later periods in the same region. Quantitative accounts of human prey choice, carcass transport patterns and indications for site-occupation intensity are summarized in light of the recently accumulating evidence. Additionally, taxonomic composition and animal body-size are used as paleoenvironmental indicators of the Marine Isotope Stage 3/2 landscape in different parts of the Levant. The role of small game, evidence for intra- and inter-site variation and possible capture methods are explored. These data are discussed against prevalent hypotheses concerning human settlement patterns, cultural change and climate forcing in the Levantine Upper Paleolithic.