



Modern Origins: A North African Perspective Abstracts



The Middle Stone Age in Tunisia: Present Status of Knowledge and Recent Advances

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During the twentieth century, four famous archeological sites were discovered in Tunisia. Each of them yielded mixed material from Mousterian and Aterian cultures.

Recent field prospecting and tests in the Mknassy Basin (Central Tunisia) have revealed many prehistoric sites; among these, some belong to the Middle Stone Age (MSA). The excavation of the Aïn El-Guettar Mousterian site (started in 2005) has yielded a faunal assemblage dominated by bovids and equids. The stratigraphic sequence contains charcoal-rich occupation layers with faunal and lithic finds. One human tooth was found in situ. A level with an Aterian industry was found beneath the Mousterian layer. The excavations at the open-air site of Aïn Oum Henda 2 (Jebel Maloussi) provided many Middle Paleolithic lithic artefacts, some of which are pedunculates. Unfortunately, there were no faunal remains.

In this paper, we propose a synthetic view regarding the succession of paleolithic cultures in Tunisia, the relationships between humans, fauna, and paleoenvironmental conditions.

Key words: Middle Stone Age, Mousterian, Aterian, human remains, mammalian fauna, lithic industry, Mknassy, Tunisia.

Vegetation and Climatic Changes During the Last 200,000 Years in North Africa. An Environmental Perspective for Modern Origins

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Following a long African history between 200,000 and 50,000 years, Northern Africa may have played a major role in the origin of the populations of modern humans that dispersed out of the continent *ca.* 50,000 years ago. What was the environmental frame of this history? How did the environmental resources for the human populations evolve and move? Which were the impacts of natural conditions on the peopling of the area?

How did environmental changes influence the mobility of the human populations?

The paper aims to present a review of the palaeoenvironmental evidence that gives a general picture of the vegetation history of this part of Africa. Direct palaeobotanical data are very sparse and cover only the most recent part of the Pleistocene and the Holocene. Some marine cores off the continent provide palynological data on the long term vegetation history but this information remains geographically insufficiently localised. Therefore we have no option but to resort to indirect complementary approaches: interpretation of lake deposits, morpho-sedimentary processes, and paleontological data (micropaleontology and palaeofaunas) in order to reconstitute the vegetation cover and the dominant palaeolandscapes. We will also rely on the coupled vegetation-climate simulations of the palaeoclimates models to try to describe the changes in the distribution of the large vegetation zones. Special attention will be paid in the paper to the possible connections between sub-Saharan Africa and Mediterranean Africa, especially those resulting in extensions or regional quasi-disappearance of desert conditions in the Sahara. In this objective the environmental history of three areas must be privileged: North-East Africa, the Atlantic Sahara and the mountain massifs of the central Sahara.

The contribution aims to provide a framework for discussing, in a multidisciplinary perspective, how past environments conditioned the development and the dispersal of the modern human populations and how these populations adapted to the environmental and climatic constraints which characterised their natural environment.

The Mousterian Site of Djebel Irhoud. A Review of the Fossil Hominin Discoveries and Their Dating

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The Jebel Irhoud site is located close to the summit of a massif of schist and sandstone about 55 km South-East of Safi (Morocco). The cave was completely filled with sand, limestone and clay containing blocks of sandstone and schist. The exploitation of a barite mine led to its discovery in 1960. In the course of the mine exploitation and several excavations, the site has yielded a rich faunal assemblage and lithics assigned to the Mousterian. More importantly, it has yielded a series of fossil hominids, initially considered as “Neandertals” or “Neandertal-like” but later recognized as representing early *Homo sapiens* in the area. In addition to the mandibular fragments from Haua Fteah (Lybia), the Djebel Irhoud material represents the most spectacular assemblage of fossil hominins discovered in North Africa in a Middle Paleolithic site. This paper will provide an inventory of the human remains found in the site and will address the issue of their discovery, stratigraphic origin, geological and radiometric age.

The Identity and Timing of the Aterian in Morocco

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In the nineteenth century the first pedunculate Aterian lithic artefacts were discovered in North Africa. Since then many other Aterian sites have come to light, but so far little has been published on any of the associated human fossils or their stratigraphic relationship with clearly diagnostic Aterian finds. A point that also needs emphasizing is that up until now the majority of Aterian human remains have come from western Morocco in a restricted area of the coastal zone between Rabat (Dar es Soltane 2) and Temara (Contrebandiers Cave and El Harhoura I Cave). This is almost certainly connected with a focus of fieldwork in this area over the past fifty years. It does not detract from the view that human remains in Aterian contexts are relatively scarce and that the understanding of their evolutionary relationship with human fossils found in the Middle Palaeolithic and Upper Palaeolithic is still problematic and controversial.

Any scope for discussing the Aterian of Morocco is still severely limited by the paucity of secure dating evidence. Although well-known Aterian sites, including those with human fossils, have been recorded on the Atlantic coast, very little dating evidence exists for the sequences in these caves. This is a major gap in our knowledge which we are hoping to rectify with new stratigraphic studies that are now in progress. If we accept the dating from some caves, it is clear that the very late record of the Aterian in Morocco of 40-20,000 B.P can certainly now be extended back well beyond 40,000 BP and probably now as far back as 82,000 BP.

Another area for discussion concerns the whole question of the nature and identity of the Aterian technology which we feel is urgently in need of review and redefinition. Up until now it has largely been accepted that the Aterian lithic technology is characterised by a dominance of flake tools and the Upper Palaeolithic by a dominance of tools on blades and bladelets. This definition, which was already questioned by early researchers, has now come under renewed challenge after recent studies of finds from Taforalt and Rhafas caves in Eastern Morocco and El Aliya Cave. In consequence, it is now increasingly clear that the Aterian represents a very flexible technology, which in addition to flake tools includes evidence for the use of “Middle Palaeolithic” blades and flake tools and even occasionally pebble tools. Much of the existing interest in the Aterian has tended to concentrate on the very narrow issue of pedunculate tools, rather than considering a wider set of variables. Finally, we feel that more consideration should be given to non-lithic aspects of the technology such as the manufacture and use of beads.

Middle Pleistocene Diversity in Africa and the Origin of Modern Humans

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There is wide agreement on a speciation event in Africa at around 0.8 or 0.9 mya when *Homo erectus* (or *Homo ergaster*) gave rise to a species named *Homo heidelbergensis*, or *Homo rhodesiensis*, or *Homo sapiens*. The new species expanded into Europe leading to the Neanderthal lineage, whereas in Africa it evolved into anatomically modern humans. The lineage of anatomical modernization can be subdivided into three groups, morphs, or grades: an early one including Bodo, Saldanha, Kabwe, Salé, a subsequent one including Florisbad, Laetoli H 18, Ileret (ER 3884), Jebel Irhoud, and early anatomically moderns with Omo Kibish, Herto and others.

Disagreement exists on the taxonomic level regarding how these groups should be distinguished and consequently about resulting phylogenies. The present paper discusses different current views, ranging from one evolving species, *Homo sapiens*, up to three species *Homo heidelbergensis*, *Homo helmei* and *Homo sapiens*.

The Upper Palaeolithic Human Remains of Nazlet Khater 2. Their Contribution to the Study of Early Modern Human Variation

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The study of modern human origins, variation and behaviour have focused mainly on two distinct periods: the oxygen isotopic stages OIS 6 and 5e with the oldest anatomically modern human remains from Africa and the Middle East and the oxygen isotopic stages 2 and 1 with the expansion of modern humans all over the world. Currently, genetic studies agree to consider that extant human populations reflect only a small part of past anatomically modern human variation. One of the key periods to try to understand the complex evolution of *Homo sapiens* is the oxygen isotopic stage 3. However, few complete human remains are known for this period, which limits the knowledge of the Upper Pleistocene modern human variation.

The Nazlet Khater 2 (NK 2) skeleton is the oldest OIS 3 complete modern human skeleton from Northern Africa. It was discovered in 1980 near Tahta in Upper Egypt by the Belgian Middle Egypt Prehistoric Project (BMEPP). This specimen was voluntarily buried and this burial was associated to the Nazlet Khater 4 chert mining site the exploitation period of which ranged from 40 to 35 Kyr BP. The Nazlet Khater 2 skeleton is complete and belongs to a young adult male. It is well preserved with the exception of the distal part of the legs and the feet. Morphological and biometrical comparative analyses of this specimen underline the complex morphology of modern humans from this time period. NK 2 exhibits several retained archaic features notably on the face and the mandible. The set of particular labyrinthine traits identified on NK 2 inner ear distinguished it partially from extant humans. Its postcranial remains are characterized by strong muscular insertions. Cross-sectional geometric properties of the long bones show adaptation to high biomechanical strength. Furthermore, Nazlet Khater 2 has vertebral and membral lesions which is unusual for a young specimen and might be related to intensive mining activities.

The study of this specimen provides an opportunity to increase our understanding of modern human variation during this time period (OIS 3) for which very rare human remains are known.

The Past, Present and Future of the Aterian

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Although known primarily from North Africa, the Aterian extends towards the south, to the Sahara, and up to the southern limit of Lake Chad. While there is general agreement that it dates most recently to about 20kyr, its origins are more disputed, with dates now being suggested at around 60 kyr to 80 kyr, or maybe more.

The Aterian was defined in Algeria by Reygasse in 1930, based on a lithic series collected in the banks of the Wadi Djebbana, which is not far from Bir-el-Ater (in the region of Tebessa). About 20 percent of the collected material consisted of stemmed pieces. This assemblage, which is very different from what was known in North Africa, quickly raised a problem concerning its origin. It was only in 1975 that human remains associated with the Aterian were recognized as such.

If even the definition of the Aterian is difficult to establish, everyone is now in agreement in attributing it to the Middle Paleolithic, as a North African facies of the Mousterian; current research continues to confirm this attribution.

Modern Human Desert Adaptations: A Libyan Perspective on the Aterian

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The present Libyan territory extends over a large area that goes from the Mediterranean coast to the Saharan desert. Aterian sites were found in the Central Saharan mountain range of the Tadrart Acacus, the Eastern Saharan massif of the Jebel Uweinat, the Maghrebi extension of the Jebel Gharbi, as well as the lowlands of Lake Shati in the central part of the country. Recent research in the Tadrart Acacus and the Jebel Gharbi has provided radiometric dates, geoarchaeological stratigraphic sequences and lithic assemblages that call for a revision of the whole chronological, environmental and functional interpretation of the Aterian industrial complex.

At a regional level, two distinct Aterian variants, one to the north (Jebel Gharbi) and the other to the south (Tadrart Acacus) of the country, display specific chronological and technological features that allow us to trace geographic boundaries, with different latitudinal and altitudinal adaptational patterns. Their differences concur to show that Aterian groups developed skills and tools to adapt to dry environments that inevitably conditioned their behaviour and settlement systems.

This paper will review the recent evidence from the Libyan Aterian sites and those that immediately preceded and followed, and will discuss both the general perspective and the regional variants within the Aterian, as well as the question of the spread of modern humans in North Africa.

Faunal Environment and Climatic Change in the Middle / Late Pleistocene of North-western Africa

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Mammals, large and small, can provide some insights into the climatic evolution of North-western Africa from the Middle to the Late Pleistocene, which witnessed the transition from the *Homo erectus* grade to *H. sapiens*. However, frequent lack of reliable dating and of stratigraphic information, erroneous identifications, and absence of archeozoological studies for old excavations, seriously hinder paleoclimatic reconstructions for many sites.

As a whole, these mammals are characterized by a low diversity, which can be interpreted as reflecting a similar low diversity and/or low productivity of the vegetation. The number of open-country bovids (alcelaphines, oryx and antilopines) vs. other bovids, and the number of desert rodents (gerbils) vs. other rodents can tentatively be used as proxies of the openness of each site.

During the first part of the Middle Pleistocene, the large mammal fauna is reminiscent of the savannah assemblages of East Africa, certainly implying strong connections across the present-day Sahara. Similar conditions seem to prevail until the end of the Middle Pleistocene, although some sites, like Salé and Doukkala, might sample less cold-dry environments.

The transition to the Late Pleistocene is marked by the extinction of several taxa among rodents, *Mus* and *Meriones* now representing the bulk of them. Gazelles become by far the most common bovids, and their dominance increases in the Late Pleistocene. Although human hunting bias cannot be ruled out for gazelles, this decreasing diversity contrasts with East Africa, suggesting some isolation, which allowed settling of Eurasian immigrants (deer, *Stephanorhinus*, *Sus*, and perhaps man), and a climatic deterioration, at least on the best sampled part of the Moroccan coast.

Morphological Continuity of the Face in the Late Middle and Upper Pleistocene Hominins from North Western Africa – A 3-D Geometric Morphometric Analysis

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The facial morphology is one of the most distinctive features of the early modern humans, especially when compared to Neandertals. The rich fossil record of Morocco allows assessment of changes in the facial morphology from the late Middle Pleistocene up to the late Upper Pleistocene. Specimens associated with the Aterian industry in Morocco were originally thought to be relatively recent (40-20 ka BP). However the re-dating of some archaeological sites opens the possibility of this assemblage being much older (50-70 ky). Predating this population we find the late Middle Pleistocene specimens of Irhoud. Later in time in the same geographical area larger samples are represented by the Ibero-maurusian series.

We conducted a 3-d geometric morphometric analysis of the facial morphology of Dar-es-Soltane 5, with the aim of deciphering the affinities and phylogenetic relationships of this specimen with earlier North African and Levantine fossils and with later Upper Paleolithic Eurasian specimens, as well as with the later North African populations. For the purposes of this analysis, we used a large comparative sample, comprising seven geographic populations of recent humans (African, Andaman, Asian, Australian, Inuit, European, Near Eastern; $n = 191$). We also employed an Iberomaurusian sample from Afalou and Taforalt ($n = 22$), and a sample of Middle and Late Pleistocene Eurasian and African fossil humans.

Data were collected in the form of 3-d coordinates of nineteen facial landmarks, designed to capture the morphology preserved by the Dar-es-Soltane specimen. Missing data were estimated during data collection only in specimens with minimal damage using anatomical clues from the preserved surrounding areas. Bilateral landmarks missing on one side were estimated by mirroring-imaging, using reflected relabelling. The specimen landmark configurations were processed using Generalized Procrustes Analysis and the fitted coordinates were analyzed using Principal Components and Canonical Variates Analyses, as well as Procrustes distances, Mahalanobis squared distances and cluster analysis. Our results are discussed in the context of Late Pleistocene human evolution in Africa and Europe.

The Aterian of the Oases of the Western Desert, Egypt

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The existence of the Aterian in the Western Desert has been known at least since the 1930s, yet many questions remain. Who produced these tanged tools? What relation did these hominids have to earlier inhabitants of the Eastern Sahara, and to those who produced tanged tools elsewhere in North Africa? Why was the innovation of tanging adopted in such a widespread manner? How does the dating of the Aterian occupation of the Eastern Sahara compare with that of other parts of North Africa?

Unfortunately, many of these questions can only be approached in a circuitous manner. Accumulated environmental evidence suggests that the climate during the last 50 ka in the Eastern Sahara was predominantly arid. Tufa deposits and lake sediments are associated with earlier Middle Stone Age (MSA) sites, but there is relatively little evidence linking Aterian materials to periods of higher precipitation. Lacking fossils, fauna, associated datable materials and even sediments, study of the Aterian of the Eastern Desert has focussed instead on the distribution of sites on the landscape, raw material use, the technology for blank production and the technology for production of tanged tools. Differences between the earlier MSA and the Aterian can be used in consideration of whether the producers of these tools were “modern humans”.

Dental Evidence from the Aterian Human Populations of Morocco

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Human remains have been discovered in several Aterian sites in Morocco. To date, these specimens represent the most complete North Saharan series of modern humans contemporary with the first modern peopling of Eurasia. Recent advances in the dating of the Aterian also suggest that they may immediately predate it. In this paper, we analyze the dental remains from the sites of Témara, El-Haroura, and Dar-es-Soltane. Metrical, non-metrical, and internal features of the teeth were assessed and compared to teeth from series of recent humans, European Upper Paleolithic, early modern humans from the Near-East and Sub-Saharan Africa, and to Neandertals. The Aterians appear to represent an early form of modern humans, displaying large tooth size and a suite of primitive features. When non-metrical features are taken into consideration, Aterians share a number of primitive traits with Neandertals. However, they lack the derived traits observed in Neandertals, such as M₃ mid-trigonid crest, P₄ asymmetry, and P₄ continuous transverse crest. We non-destructively measured enamel thickness in a subset of the Aterian molars and found that relative and absolute enamel thickness is similar to Middle Stone Age humans from South Africa, as well as a global sample of recent modern humans. Enamel thickness in the Aterian sample appears to be greater than that of Neandertals, which show a derived condition of relatively thin enamel compared to *Homo sapiens*. Aterian humans may provide us with the closest proxy for the African Paleolithic populations that undertook the last out-of-Africa movement. Their dental remains are crucial to the interpretation of the European sub-contemporary material and to the understanding of the replacement process of local Eurasian populations by modern immigrants.

A 350 kyr Marine Record of Landscape Evolution in the NE Sahara: Implications for Human Population Dynamics in the Gateway to Asia

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Unravelling the role of African climate variability on landscape and human evolution has been made difficult for various reasons. Continental records are scarce, short, and fragmentary, and therefore do not provide a continuous view of environmental variability at all timescales and locations within Africa. Marine records of dust deposition into the Atlantic and Indian Oceans might partly overcome these inconveniences, but they are, to date, very difficult to link with environmental variations in specific portions of the vast North African desert belt. Further complications arise from the fact that the study of the human fossil record and its environmental context has been strongly biased towards East Africa, rather than the whole area where significant events in human evolution – including the emergence of modern humans – might have occurred.

Here we recall a record of Saharan dust supply into the eastern Mediterranean Sea produced from ODP Site 967. This record documents environmental variation in a specific location within Africa, the NE Sahara, while taking into account the physiography of the region and its interaction with climatic processes. The Site 967 dust record documents variations in the supply of aeolian dust from the Libyan and western Egyptian lowlands located north of the central Saharan watershed at 18-22°N. We relate dust flux minima to penetration of the western African summer monsoon front as far north as 25-28°N. This would have resulted in expansion of the savannah and in formation of freshwater lake and fluvial systems in the dust source regions, thereby inhibiting formation of dust. Our results indicate that such “greening” of the NE Sahara recurred, modulated by orbital precession, obliquity, and eccentricity, during insolation maxima throughout the Pleistocene and the Holocene. During insolation minima, lack of monsoon rains converted the NE Sahara into the vast, hyper-arid dust factory that it constitutes nowadays.

Archeological evidence attest to Neolithic and Paleolithic human occupation in the NES at past pluvial episodes that are simultaneous within the errors of ¹⁴C and U-series dating, with periods of low dust contents in the ODP Site 967 dust record. On the contrary, periods devoid of human occupation in the NE Sahara correspond to high dust contents in the ODP Site 967 dust record, especially between 75 and 10 kyr BP. This demonstrates that “green” NE Sahara episodes were suitable for recurrent human occupation, which likely acted as a sponge absorbing and expelling human population at the pace of environmental changes driven by insolation cycles. Such circumstances have conditioned important cultural revolutions in the Holocene, and are likely to have also affected cultural, and perhaps evolutionary, events during the Plio-Pleistocene. Our results reinforce the view that the NE Sahara, given its key location as the gateway to Asia, should be considered when discussing the role of climate and landscape variability in the emergence and out-of-Africa dispersal of modern humans.

Orbital Forcing of Dust Supply and Productivity Variations in the NW African Margin Over the Last 250 kyr: A Multi-Proxy Climate Reconstruction from Marine Sediments

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In the NW African margin, a strong interaction between the atmospheric and ocean circulation systems occurs: trade winds drive seasonal coastal upwelling, while dust storm outbreaks from the neighboring Saharan desert are the major source of terrigenous sediments. In the North Canary Basin, located between 34°N and 28°N latitude in the Northwest African margin, the recovery of nearly a hundred sediment cores in the framework of the CANIGO European project (*Canary Islands, Azores and Gibraltar Observations*) has promoted high-quality paleoclimatic research. Two of these gravity cores, GeoB 5559-2 and GeoB 4216-1, were studied in detail in order to investigate the forcing mechanisms for dust input and wind strength in the North Canary Basin, and the climatic teleconnections between high and low latitudes in the glacial-interglacial transitions. Therefore, the study of marine sediments offshore NW Africa provides evidences of changes in climate and landscape distribution on land during the last 250,000 years that can be useful for the understanding of the origin of human populations and the patterns of their dispersion out of Africa ca. 50,000 years ago.

Based on a comparison of the obtained marine records with summer insolation variation at 30°N and after spectral analyses to detect the presence of cyclicities, we observed that the temporal variation of the terrigenous input and paleoproductivity proxies are mainly controlled by two orbital parameters: precession (23,000-year cycle) and eccentricity (100,000-year cycle). The effect of precession has been interpreted as the influence of seasonality on dust generation and its posterior transport to the North Canary Basin. As can be presently observed, a high seasonality favours dust production and export to the atmosphere. Thus, during hot and wetter summers, monsoonal rains in the Sahel region provide the humidity that is needed for the generation of dust particles of a suitable size to be wind-transported. During cold and arid winters, the meteorological scenario facilitates the transport of dust particles by the Saharan winds. Superimposed to this precessional pattern, maxima in productivity and grain-size both appear at Terminations I to III. At these periods of higher insolation but lower sea surface temperature (SST) over the North Atlantic, the subtropical anticyclonic circulation may have intensified. Then, the strengthened trade winds forced upwelling and had the ability to carry coarser particles at terminations. Therefore, SST variations in the North Atlantic provide a mechanism to explain changes in trade wind intensity. Moreover, this conclusion reinforces previous ideas on how SST changes in North Atlantic have influence upon the African climate.

The Archaeological Context of the Aterian Human Remains from the Tamara Region (Maroc)

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In the 1970s, in the region of Témara, on the Moroccan Atlantic coast, for the first time in North Africa, a series of discoveries directly associated human remains with an Aterian archeological context. From a paleoanthropological point of view, these discoveries confirmed that the Aterian was associated with *Homo sapiens* and not an *Homo neanderthalensis*, as was previously proposed. Human remains are associated with the Aterian at three caves: Dar-es-Soltane 2, El Harhoura 1 and Les Contrebandiers. In Dar-es-Soltane 2 and El Harhoura 1, the levels with human remains are characterized by the small number of artifacts. The presence of rare tanged points is, however, an argument for an Aterian attribution. We compared the documentation available with that recently acquired in the caves of El Mnasra and El Harhoura 2. No human remains have been discovered in these two caves; nevertheless, it brought important precision on the human behavior during the middle Paleolithic in this region. Tanged points do not appear as the only diagnostic elements: the presence of micro-Levallois cores (Asinipodian type) and the use of local raw material resources confirm that the behaviors do not differ from a cave to another. Other elements, first among these are the stone features, allow us to discuss the regional archaeological context of the Aterian. The Middle Paleolithic of the Témara region appears as a cultural phase with the same homogeneity as the human remains relating to it. However, there remain questions concerning the modalities and the intensity of the human occupation in this region.

The Chronology of the Middle Palaeolithic in North-West Africa

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The chronometric data available for the Middle Palaeolithic (MP) in North-West-Africa provides a rather diverse picture, which leaves room for many interpretations. The two most important technocomplexes in northwest Africa, the Aterian and the Mousterian, are either viewed as distinct entities in a certain chronological order, sometimes subdivided in relatively well defined post- and pre- sub-entities, with varying stratigraphical and chronometrical support, or as two MP units with considerable overlap. In general their relationship is commonly viewed as the Aterian following or evolving out of the Mousterian. However, given the typo-technological similarities, they could be just functional expressions, or/and belong to different ethnic/cultural groups which are sharing the same region, but not necessarily at identical times.

The common basis of any model used to explain the diverse archaeological data is the chronometric information obtained from the individual sites. This is especially true for north-western Africa, which lacks long high resolution sequences that would allow for the study of an 'evolution' of stone technology/typology and which could serve as the backbone for a chronostratigraphical framework.

The chronometric data available are dependant not only on the techniques used, but also more importantly on the unequivocal association of the sample with the archaeological entity. Critical analysis leaves few chronometric data for any interpretation on a larger scale, e.g. the establishment of a chronostratigraphy for a region(s). However, taken at face value the Mousterian ranges from about 200 ka to 20 ka and the Aterian from about 90 ka to 12 ka (both upper limits in radiocarbon years). It appears that there is considerable overlap between the two, and at least the Aterian seems to overlap chronologically with the chronologically following technocomplex of the Iberomaurusian, which is the first Upper Palaeolithic (UP) entity in the region. Recent excavations provide new data and new samples for chronometric dating from well controlled conditions, which allow the application of luminescence dating techniques on layers sampled for radiocarbon analysis as well. It is therefore possible to check radiocarbon dating results in the lower range limit of the method, and provide age data beyond this limit to investigate the validity of finite radiocarbon age results, e.g. Jebel Irhoud (Morocco). Additionally, the interstratification at Ifri n'Ammar (Morocco) challenges the current view of a simple succession of Mousterian and Aterian which is supported by chronometric age results.

Climatic Changes in the Late Pleistocene of the Eastern Sahara

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Reconstructing the paleoclimatic history of the Eastern Sahara directly from local, terrestrial records has been hampered by the lack of long-term continuous Pleistocene sedimentary archives. Rather better data are available for the widely recognized Early Holocene pluvial phase; however, sedimentary paleoclimatic indicators suggest conditions were different (less wet) in parts of the Eastern Sahara during the Holocene pluvial than during prior episodes of enhanced rainfall. Thus the details of Holocene pluvial rainfall distribution and magnitude cannot necessarily be used as an analog for those earlier pluvial phases.

Pleistocene paleoclimatic proxies from the region are principally lacustrine, spring, and fluvial sediments, though a few speleothem records are available, as well as eolian indicators of arid conditions. The distribution of dates on sediments indicating humid conditions throughout the last 350 ka suggests that periods of enhanced rainfall occurred more frequently than every ~100 ka but the often 10-15% error associated with these dates precludes direct assessment of shorter period cyclicality. Furthermore, due to pluvial phase groundwater recharge, some areas would have persisted as oases following the cessation of enhanced rainfall. Thus not all dates on sediments indicative of enhanced rainfall relative to the present necessarily record local rainfall over the Eastern Sahara. In some instances minor and trace element geochemistry may be used to deconvolve these signals.

While the involvement of Atlantic-sourced precipitation in these pluvial phases seems fairly well-established, the Eastern Sahara may also have seen late summer Indian Ocean sourced rainfall or Mediterranean-derived winter rains. Paleoenvironmental records permitting quantitative rainfall estimates from longitudinal transects of the Eastern Sahara would be critically important in understanding rainfall distribution. Seasonality records, such as those derived from freshwater mollusks, could also be instrumental in reconstructing rainfall sources. The existence of a second yearly rainy season during pluvial phases would change the nature of resource availability for occupants of the region.

Late Pleistocene Subsistence in Northwest Africa: the State of Our Knowledge and Placement in a Continental Context

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Zooarchaeological evidence has featured prominently in the debate of the mode and tempo of modern human origins during the Late Pleistocene of Africa. However, most of the assemblages included in the discussion are from Southern Africa, and we have limited knowledge about human paleoecology from other parts of the continent. This paper aims to review the zooarchaeological record for Late Pleistocene subsistence in Northwest Africa. This region provides some of the earliest and most complete fossil evidence for anatomically modern humans, and it provides a unique aspect of human technological development in the Aterian stone tool industry. Understanding the subsistence of these early people is important for understanding human behavioral evolution. The Northwest African record will be placed in the context of what is known about Middle Stone Age subsistence in the rest of Africa, and future research directions will be offered.

“Out of Africa 2” and Egypt - an Evaluation

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There seems to be no doubt that AMH originated (mainly) in Africa sometimes at the end of the Middle Pleistocene. There is still some discussion which geographical corridor was used to reach Asia (Cavalli-Sforza *et al.* 1994, Lahr and Foley 1994, Underhill *et al.* 2001, Maca-Meyer *et al.* 2001, Luis *et al.* 2004). Based on MtDNA and on Y-DNA most authors suggest that AMH first left Africa crossing de Bab-el-Mandab. The Nile Valley is considered as not important because no haplotypes of the early AMH are present in the actual population.

The implications of such a model will be evaluated against the data provided by research in the Egyptian Nile Valley.

1. Few human fossils in the Nile Valley and in Arabia.
2. Climatic and geomorphologic conditions in the Arabian and the Egyptian area during the presumed time of the “Out of Africa 2”.
3. Reduction of the human population in the Nile Valley during the later Middle Palaeolithic and the Upper Palaeolithic.
4. During the OIS 3, dunes from the Sahara have invaded the Egyptian Nile Valley, damming the valley at several points. Large intra-valley lakes were created along which fishers have settled. The catastrophic events (dam breaching) in the Egyptian Nile Valley at the start of the Tardiglacial (Bølling) resulted in a disappearance of a human population in the Egyptian Nile Valley (Vermeersch *in press*).
5. The repopulation of the Egyptian Nile Valley started with the increased dryness of the Sahara (Kuper and Kröpelin 2006) around 5500 BP.
6. The present Egyptian population should not be used for DNA studies related to “Out of Africa 2”.
7. The absence of good comparable Middle Palaeolithic sites in the area.
8. Very early Upper Palaeolithic presence in the Egyptian Nile Valley.