Project SAHEL – The research context of a Palaeolithic case-study in West Africa

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Presented by Vicky Winton. Thanks to Oumarou Idé for allowing V. Winton to present the paper on the Mékrou Valley, the subject of his PhD and subsequent research. Thanks to the British Academy for funding the work. Thanks to Dr Anne Haour for her help and advice.
First, the presentation outlines the reasons for the research project. This is followed by a description of the Stone Age archaeological sites of the Mékrou Valley in southwest Niger; an outline of the 2004 field-season and a discussion of the project’s potential.
1. Research Context
Winton’s previous research focussed on the early occupation of Britain, with particular reference to high-level sites located on the southern Chalk Downlands (Winton, 2004). This work high-lighted the dynamic nature of geomorphology in relation to the preservation of early Palaeolithic archaeological sites and the importance of sites at topographically high locations in the landscape.

Solution features in the underlying Cretaceous Chalk creates sediment traps which preserve Lower Palaeolithic sites and artefacts in sharp condition, including technological refits (Scott-Jackson, 2000). High level sites, which preserve assemblages of Palaeolithic knapping debitage and a range of stone tools in sharp condition, offer important comparative perspectives to time-averaged, water-rolled (perhaps long-distance transported) Palaeolithic artefact assemblages from topographically low-level, river gravel terraces in the UK.

Alongside considerations of landscape use and site preservation, the question of Acheulian biface morphological variability was a major concern of Winton’s doctoral research (Winton, 2004). Acheulian biface morphological variability cannot be comprehensively investigated on a local or even regional scale and a driving motivation behind the 2004 Mékrou Valley project was to investigate the potential for establishing a comparative regional research project in an area of West Africa where the Acheulian is documented (Vernet, 1994, 1996; Idé, 2000).
Broad questions arising from Winton’s doctoral research included the degree to which Acheulian biface-making archaic humans coped with environmental change by technological innovation. The Sahel region of Southern Niger offers a comparison for southern Britain in terms of being on the southern border of an expanding desert (Sahara desert and ice sheet respectively) and in an environmentally dynamic region during the Pleistocene.

Previous work in the Mékrou Valley indicated that, by correlating the Quaternary deposits with Terrace 3 of the Niger River, the former were likely to be less than 300,000 years old Idé (2000:226). Schematic sections and descriptions of the Quaternary sediments associated with Stone Age artefacts in the Mékrou Valley noted the presence of sands (Vernet, 1996; Ide, 2000) suitable for dating by Optically Stimulated Luminescence (OSL). Chronometric dates for the Quaternary sediments would be a crucially important contribution to make to archaeological research of the Mékrou Valley, in order to set the prehistoric occupation within its temporal and environmental context. Professor Helen Rendell of Loughborough University agreed to undertake a preliminary investigation of the Mékrou Valley Quaternary sediments and test their applicability for OSL dating.
From the point of view of human evolution studies more generally – it is interesting to note that very little research has yet been conducted on intra-African population movements, with a greater emphasis on the earliest appearance humans outside the African Continent – West Africa is more or less a blank. Finds of 6 million year old *Sahelanthropus tchadensis* and 3 million year old *Australopithecus bahrelghazali* (Brunet et al. 2002; Brunet et al. 1995) in sediments of the Chad basin suggest an early westerly distribution of hominins with no clear reason for hominin absence in West Africa during favourable climatic phases of the Pleistocene.
Beyond the Acheulian
MSA from 250 kya: more widespread and technologically more diverse than ESA...West Africa?

A broad ranging synthesis of Middle Stone Age occurrences across the African Continent (McBrearty and Brooks, 2000) confirms that very little is known of the West African Middle Stone Age archaeological record. The Ounjougou region of the Dogon Plateau in Mali has been the subject of extensive recent research and demonstrates a varied and punctuated Middle and Late Stone Age occupation of this area dating from before 70,000 years ago to the Holocene (Robert et al., 2003; Huysecem et al., 2004; Rasse et al., 2004).
From a geomorphological point of view, it seems that there is considerable potential for Early and Middle Stone Age archaeological sites in West Africa. In addition to artefacts found as deflated surface lag, artefact assemblages in river sediments provide an indication of archaic human presence that is worth mapping. The Jos Plateau in Nigeria yielded evidence of Early Stone Age activity in the form of Acheulian bifaces discovered at a depth of 14 metres during the mining of alluvial deposits for tin (Fagg, 1956; Shaw, 1978). The Jos Plateau has also been subject to volcanic activity during the Pleistocene (Wright et al. 1985:141), which may provide a method of dating stratigraphic sequences, whilst mining activity allows access to deeply buried sediments. On the coast of Sierra Leone and Ghana are Pleistocene beach deposits – perhaps equivalent to those that preserved the 500,000 year old site of Boxgrove in southern Britain (Matthew Pope of University College London, pers. comm.). The inland delta of the Niger river 300km northeast of Bamako in Mali may preserve important sediments akin to the clayey, lake deposits that preserved the Acheulian biface sites of Erg Tihodaïne in southern Algeria (Arambourg and Balout, 1955) and Adrar Bous in Niger (Clark, 1973). The possibility of Early Stone Age sites occurring within the rainforest zone of West Africa is currently under investigation (see Julio Mercader SAFA keynote lecture, 23rd June, 2006; Mercader (ed.), 2003). Research in the Ounjougou region of Mali has yielded numerous sites in a variety of sedimentary contexts and these have recently provided the first chronological framework of OSL dates for Middle Stone Age occupation in the West African Sahel (e.g. Rasse et al. 2004). Potential for detailed regional environmental reconstruction is provided by off-shore pollen records of the Niger delta fan (Lezine and Cazet, 2005) and cores of the sediments in Lake Bosumtwi, Ghana (Brooks et al. 2005).
2. The Mékrou Valley, S.W. Niger

A West African Early and Middle Stone Age case study site.
The Mékrou River is a tributary of the Niger River and forms the border between Benin and southwest Niger.
The Mékrou Valley also represents the northernmost exposure of metasandstones of the Volta basin Precambrian rocks that are suitable for stone tool manufacture – this too, may have been a significant attribute of the Mékrou region for early Prehistoric populations.
The Mékrou Valley is currently situated within the Sudanian ecological Zone, receiving around 700-800 mm of rain per year. The Valley is under the jurisdiction of the Parc W. On the plus side the area is protected and has not been permanently inhabited since the 1950s; the parc is subject to European funded archaeological survey e.g. the ECOPAS, 2002 report. On the downside, it can be logistically difficult to access the Mékrou and work in an area of designated wilderness.
Early, Middle and Late Stone Age sites have been recorded regionally – see Vernet, 1996.
This map shows the known archaeological sites of the middle section of the Mékrou River. Note the remarkable angled change in the direction of flow of the River, from north to east. This suggests a relatively young age (Late Pleistocene) for the river in its current form (Idé, Betrouni and Aumassip, 2005). However, no absolute dates for the earlier Stone Age sites exist. The 2004 field-season therefore aimed to explore the potential of the region for further archaeological investigations and test the applicability of OSL dating of the Quaternary and Holocene sedimentary sequence of the Mékrou Valley.
The stratigraphical sequence of the Quaternary and Holocene sediments as currently understood is shown in the schematic section drawing above. The layers highlighted in yellow here relate to what Idé, Betrouni and Aumassip (2005) interpret as the first of two climatic cycles representing a general trend towards the deposition of finer particles from coarser, gravels at the base. The lower gravel G is argued to represent a drier climatic phase, whilst F through to E demonstrate the onset of more humid conditions and the deposition of fine overbank sediments. Occupation of the Mékrou region by archaic humans is thought to coincide with climatically drier phases of the Late Pleistocene. Artefacts are found in Unit G, but not Unit F and E.
Mékrou River, base of Quaternary sediment sequence:

Gravel containing Acheulian artefacts forms river bed

Fine sediments overlying gravel

Mékrou River

This image shows the western bank of the Mékrou Valley as the river flows northwards. Units G and F can be seen here (the basal gravel and fine, overbank deposited sediments respectively). The Unit F was sampled for analysis and OSL feasibility testing.
The Assemblage from Unit G includes bifaces, flakes and polyhedrons, generally in very weathered and/or water-rolled condition as can be seen in the following examples.
Two faces of four bifaces from Unit G

Four small, quartzite, bifaces from Unit G. The third artefact from the left is a cleaver made on a flake.
Two faces of one quartzite biface from Unit G

The face on the right hand side is in fresher, sharper condition than the face shown on the left. This indicates that the artefact has been lying in one position with one face more (left) exposed to damage than the other (right).
The dorsal faces of the flakes are shown above, ventral surfaces below. Note the sediment adhering to the face of the biface shown in the upper image which may be a remnant of the sediment in which the artefact was previously buried.
In the second climatic cycle of sedimentation as interpreted by Idé, Betrouni and Aumassip (2005), an arid phase led to a sedimentary hiatus and then the deposition of Unit D, during which humans are once again present in the Mékrou region, this time using Middle Stone Age technology. A subsequent semi-arid phase once again led the river to flood its banks depositing Unit C, with which no artefacts are associated, whilst Unit B and A represent progressively arid phases associated with Late Stone Age and Holocene occupation.
A view across the gully-eroded sediments of Units E (at the base) to A (uppermost soil).
Middle Stone Age of Mékrou Valley, figures after Idé, 2000
The Middle Stone Age artefacts of the region include various prepared core technique products, flake tools and bifacial foliates. Cherts were commonly used as raw material.
Oumarou Idé pointing to a quartzite core in gully-eroded, fine sediments of Unit D.
A large cutting tool (triangular) of quartzite from the gully eroded surface.
Is there potential for dating the archaeological evidence by OSL?
Adjacent to Mékrou River – Gully eroded fine sediments with indurated, ferruginous horizons: Unit D

3 light-fast, blocks were cut from the fine sediments sandwiched between indurated, pebbly horizons. Rendell (Loughborough University) reports that colluviation is a likely mode of sediment deposition and that the modal grain size is silty, rather than sandy. Efforts to arrive at protocols for OSL dating of silt-sized, feldspar grains is underway (Rendell et al. 2005).
Hopes of dating sands stratified within Unit G were not realised since clayey and insufficiently thick sand horizons were encountered (scale bar here is 30 cm in total length).
3. Discussion and Conclusions
Late Pleistocene sites in the Ounjougou region of Mali have provided the first chronometrically dated framework for Stone Age occupation in West Africa. No Acheulian artefacts are reported from this site. Simple core and flake artefacts at the Kokolo 2 site, originally thought to represent an Oldowan technology have since been confirmed to have a Late Pleistocene age (Soriano, 2003). The Middle Stone Age assemblages from a number of key sites are technologically diverse and attest to punctuated occupational events by people with different stone-working traditions. At present, the Mékrou region would seem to follow a similar pattern of punctuated occupation events rather than in situ development by a single resident population. OSL dating has been successfully applied to Quaternary sediments of the Ounjougou sequence and may yet prove to be applicable in the Mékrou region. However, finer-grained, Quaternary sediments of the Mékrou Valley tend to be silty rather than sandy, indicating a necessity to design specific, feldspar-based, protocols for OSL dating (Rendell pers. comm.). In the field, gamma spectrometer readings are required.
Given the highly weathered and/or water-rolled condition of the artefacts from Unit G and the likelihood that these are in secondary context, it would be desirable to locate intact Acheulian assemblages of tool-making debitage for analysis. One possibility is that remnants of Acheulian activity might be preserved in sediments that have accumulated in sediment catchments on the quartzite bedrock outcrops some 200-500 metres north of the middle Mékrou River as it assumes its easterly direction of flow.

Quaternary research in the UK has shown that solution features in Chalk (Scott-Jackson, 2000) are not the only mechanism for the formation of sediment traps that can preserve Palaeolithic sites at elevated topographical levels in the landscape. Colcutt (2001) discusses examples of Palaeolithic sites in the UK preserved in sediment traps in sandstone rock formations which were created by faulting. Winton suggests that mild tectonic activity and up-lift of rocks in the Mékrou Valley prior to and during the Pleistocene, as demonstrated by the recent capture the Mékrou (Idé, Betrouni, Aumassip, 2005) may have led to faulting that provided sediment and archaeological site catchments at relatively high-levels in the landscape. Windblown sediments (common in this region bordering the Sahara desert as they are at higher latitudes close to ice sheets) that have settled in sediment traps across this surface would act to preserve archaeological sites and perhaps provide a means of dating them.

The quality of fresh raw material exposed at the outcrop would have attracted Acheulian stone-tool makers and more recent knapping scatters can be found across the surface of this tract of landscape. Vantage and seasonal water pooling may have been additional points of attraction for prehistoric peoples in this landscape. The lack of vertical erosion in this zone is a hindrance to site visibility but sites need not be prohibitively deeply buried (Colcutt, 2001:228). Flake scars on the outcrop from Stone Age raw material quarrying and more recent knapping scatters on the surface may indicate favorable/likely locations for further investigation.
Broadening the geographical scope of research, the Dallol Bosso Valley which adjoins the Niger Valley near to the confluence of the Mékrou River on the opposite bank, is of particular interest. Given the punctuated sequence of Pleistocene occupation in the Mékrou Valley, the relative positions of the Mékrou and Dallol Bosso valleys may be significant, since the Dallol Bosso forms a major north-south trending geographical feature that could have acted as a watery conduit for movement of archaic populations from the drying north to more hospitable environments to the south. The Dallol Bosso no-longer drains the Azawagh basin which during wetter times was supplied from the Atakor and Aïr Massifs of the Sahara. A survey for sites in the Dallol Bosso Valley may provide clues to the regional context of Early and Middle Stone Age occupation of South West Niger, its temporal framework and its association with the occupation of the Sahara.
Future work in the Mékrou region should include excavation within Unit D, since, in accordance with the interpretation of Idé, Betrouni, Aumassip (2005) we should expect to find Middle Stone Age occupied landsurfaces, gently covered by overbank, flood deposits of the river in these sediments. OSL dating is likely to remain rather problematic due to grain size. Any burnt chert artefacts could provide thermoluminescence dates and it is possible that radiocarbon dating may also provide a tool for building a chronological framework towards the younger end of the timeframe represented – radiocarbon and TL dates were obtained from charcoal and fired clay from the Mékrou Valley during investigations of the regional occupation during historical times (Haour et al. in prep.). In terms of the Early Stone Age ‘Acheulian’ occupation, remnants of occupied river bank or sand/gravel bar may be preserved within Unit G. An alternative future research direction that may provide data to help answer questions about the relationship between archaic human behaviour and environments in the Mékrou region is based on a theoretical proposition and involves a survey for sites on the Fofo outcrop of quartzites. The aim of this work would be to locate and excavate Acheulian tool-making / occupation sites preserved within sediment traps on a quartzite outcrop. More generally, Vernet (1996 – see slide 16 here) has already demonstrated that Stone Age sites/find spots exist across southwest Niger. Further analysis of these localities / artefacts and further survey regionally, for instance survey along the Dallol Bosso Valley, would help to tie the Mékrou Valley Stone Age sites into a wider geographical and temporal context and elucidate patterns of landscape use during the course of the Pleistocene.
References A-E:


References F-M:


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References N-Z:


