Ounjougou (Mali): A history of holocene settlement at the southern edge of the Sahara

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The area of Ounjougou consists of a series of gullies cut through Upper Pleistocene and Holocene formations on the Dogon Plateau in the Sahel at the south edge of the Sahara Desert. Here the authors have chronicled a stratified sequence of human occupation from the tenth to the second millennium BC, recording natural and anthropogenic strata containing artefacts and micro- and macro- palaeoecological remains, mostly in an excellent state of preservation. They present a first synthesis of the archaeological and environmental sequence for the Holocene period, define five main occupation phases for Ounjougou, and attempt to place them within the context of West African prehistory.

Keywords: Neolithic, Holocene, West Africa, Mali, Dogon Plateau, settlement history, palaeoenvironment, lithic industry, ceramics, grinding implements.

In sub-Saharan West Africa traces of Early Holocene occupation are sparse, and more recent sites are generally restricted to a short chronological span. It is therefore rare to be able to examine a long sequence of climatic, environmental and cultural interactions for this period. The archaeological strata described here from the Bandiagara Plateau in Mali (Figure 1) provide a new basis from which these interactions may be examined.

Previous archaeological and palaeoenvironmental descriptions of the Bandiagara Plateau consist of only a short note which mentions the existence of a Neolithic occupation (Szumowski 1956). We define here as *Neolithic* the populations producing ceramics and using grinding implements prior to the appearance of metallurgy, and who may or may not have practised agriculture and animal husbandry. Our exploration of this areas began in winter 1993-1994, when survey led to the discovery of the Ounjougou site complex (Huysecom 1996). Situated around ten km east of the city of Bandiagara, this complex includes numerous archaeological sites within a zone of 10 km^2 on the sloping valley of the Yamé, a tributary of the Niger (Figure 1). Currently located on the southern edge of the semi-arid Sahelian zone, it comprises a series of gullies cut into a complex succession of Quaternary aeolian, alluvial and colluvial deposits. The 16 m thick stratigraphic sequence has yielded archaeological material from the Lower Palaeolithic to modern times. The

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sediments also contain abundant palaeoecological remains (pollen, leaves, charcoal, wood, seeds, etc.) for which the state of preservation is exceptional for the sub-Saharan area. The value of the Ounjougou site complex for examining relationships between human occupation and environmental variation over a long chronological sequence motivated the development, in 1997, of an international interdisciplinary research program titled "*Palaeoenvironment and human settlement in West Africa*" (Huysecom 2002). Research undertaken to date has

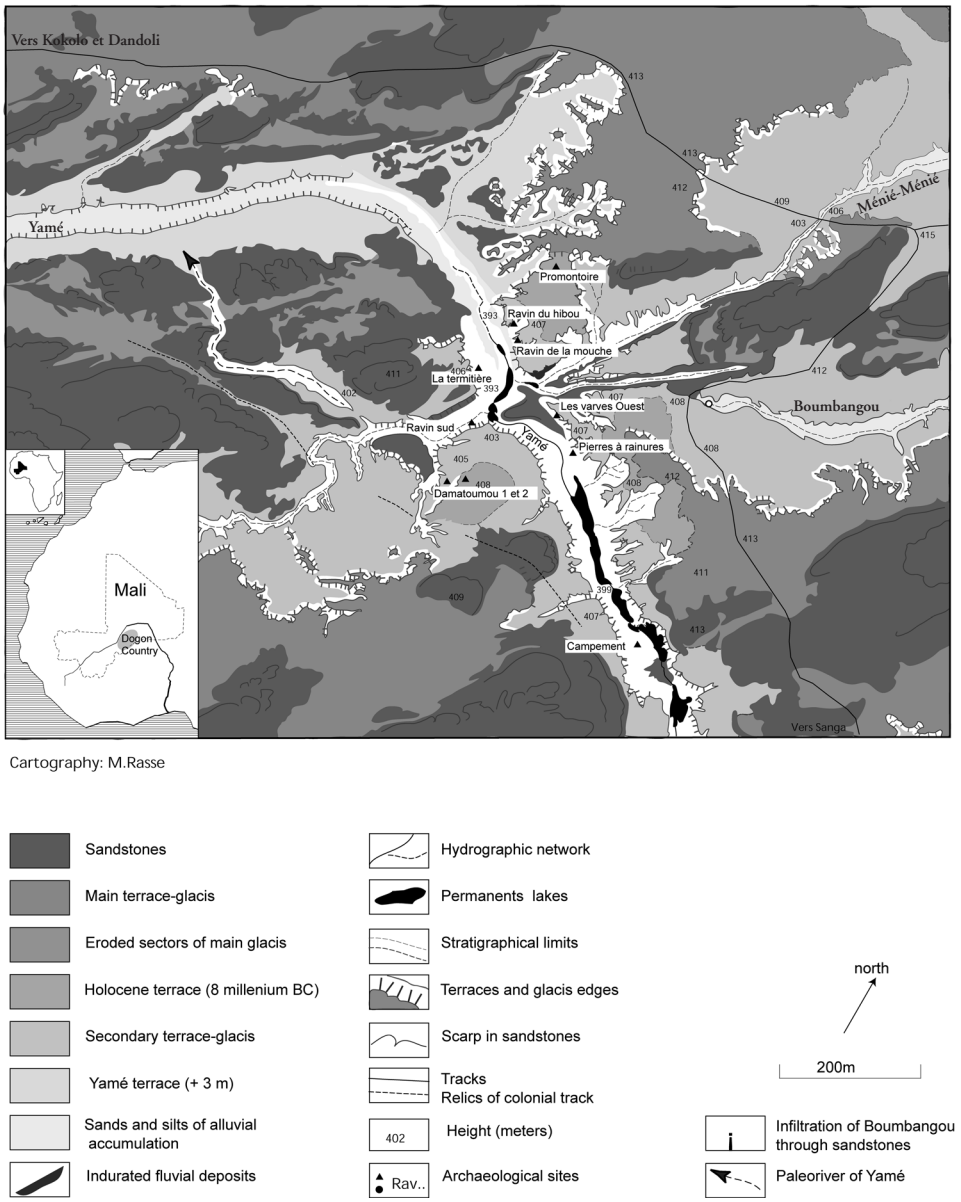

Figure 1. The Ounjougou valley in the Dogon Plateau: general plan and location. Sites of archaeological investigations are marked with a triangle.

permitted the establishment of a preliminary sequence and occupations from the Pleistocene to the historic period to be identified (Robert *et al.* 2003; Mayor *et al.* forthcoming). The present article focuses on archaeological and palaeoenvironmental data for the Holocene, covering the period from the tenth to the second millennium BC.

The Holocene sequence of Ounjougou and the five occupation phases

The Holocene sites of Ounjougou are distributed around a confluence zone where four watercourses meet, and the main permanent water source for the region is found (Figure 1). From a hydrographical point of view, it appears that the confluence has undergone changes in riverine/lacustrine flow regime which are represented by the deposition of a complex suite of sedimentary facies ranging from imbricated gravel-dominated open channel facies, through to fine grained and organic-rich lacustrine and slackwater deposits. Archaeologically, these sites are either habitations in primary position on recent terraces, or on the valley floor covered by rapid colluvial deposits or overflow, or sites on the valley floor where the archaeological material, although discovered in stratified levels, is no longer in primary position, but is derived from nearby habitation sites.

The results of our research currently permit us to define five principal occupation phases on the basis of chronostratigraphic, archaeological and palaeoenvironmental data. These are discussed separately below.

Phase 1 (tenth – beginning of the ninth millennium BC)

After a favourable humid climatic period, characterised by relatively dense and diversified Palaeolithic occupations, the arid Ogolian begins locally around 23 000 BP and is represented at Ounjougou by a significant depositional and archaeological hiatus (Robert *et al.* 2003). It

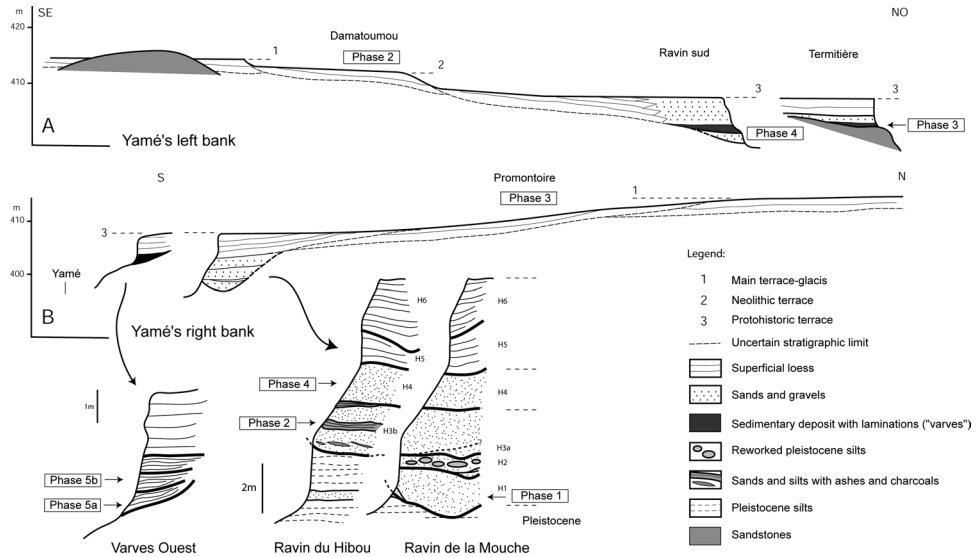

Figure 2. Stratification recorded at the main sites

is not until the Holocene and the return of humid climatic conditions, beginning in the tenth millennium BC, that it is possible to again observe evidence of human occupation. The first phase has been defined at the site of *Ravin de la Mouche* (*Gully of the Fly*). This site on the valley floor is in the fill of a 15 m deep incision cut into earlier formations. The first depositional episode is distinguished by the filling of a large channel (H1) cut into the underlying Pleistocene loess by more than 1.5 m of very coarse sands and gravels which were then covered by coarse sands (H2) surrounding reworked blocks of Pleistocene silts (Figure 2). The beginning of phase 1, which is not currently dated, is thus characterised by high-energy runoff that reveals the hydrological capacity of the Yamé to be higher than the current course and suggests strong seasonal precipitation. The total absence, at present, of charcoal in these deep deposits probably indicates the rarity of fires during these initial humid periods.

The flood level of the river was stabilised soon after, as is demonstrated by the deposition of the first levels of lesser energy sediments (H3a), evidenced by finely bedded silts in a matrix of less coarse sands. Some charcoal is present, but it is currently impossible to determine if it is of anthropogenic or natural origin. A radiocarbon date places levels H3 at the transition between the tenth and ninth millennia BC, and constitutes a *terminus ante quem* for the deposition of the first Holocene channels (Figure 3). The lithic industry found in stratigraphic context in the different deposits of phase 1 shows that quartz cobbles

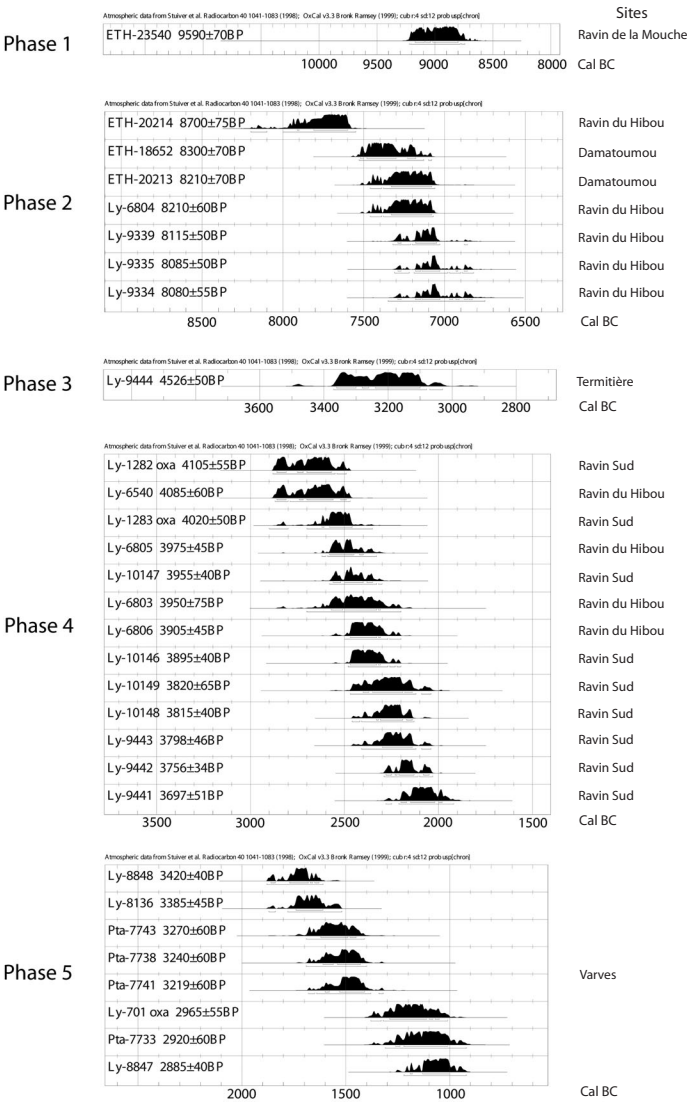

Figure 3. Radiocarbon dates from Phases 1-5. For the sites, see text.. All BC dates are calibrated to 1 sigma (Oxcal v. 3.5 Bronk Ramsey 2000; atmospheric datas: Stuiver et al. 1998).

from the local sandstone substrate were the dominant raw material, but sandstone and flint were also exploited (Figure 4; table 1). Although the low number of cores makes it difficult to precisely determine the reduction strategies employed, the unidirectional mode seems to have been preferred. The typological range primarily includes small retouched flakes (L<3 cm) and bifacial armatures with covering retouch, including a fusiform one with a rectilinear base. The discovery of a ceramic sherd during the 1993 survey, appearing to belong to level H1, must be confirmed in subsequent field seasons. In general, even if the remains are not in primary position, they show that people inhabited the length of the Yamé from the very beginning of the Holocene climatic amelioration.

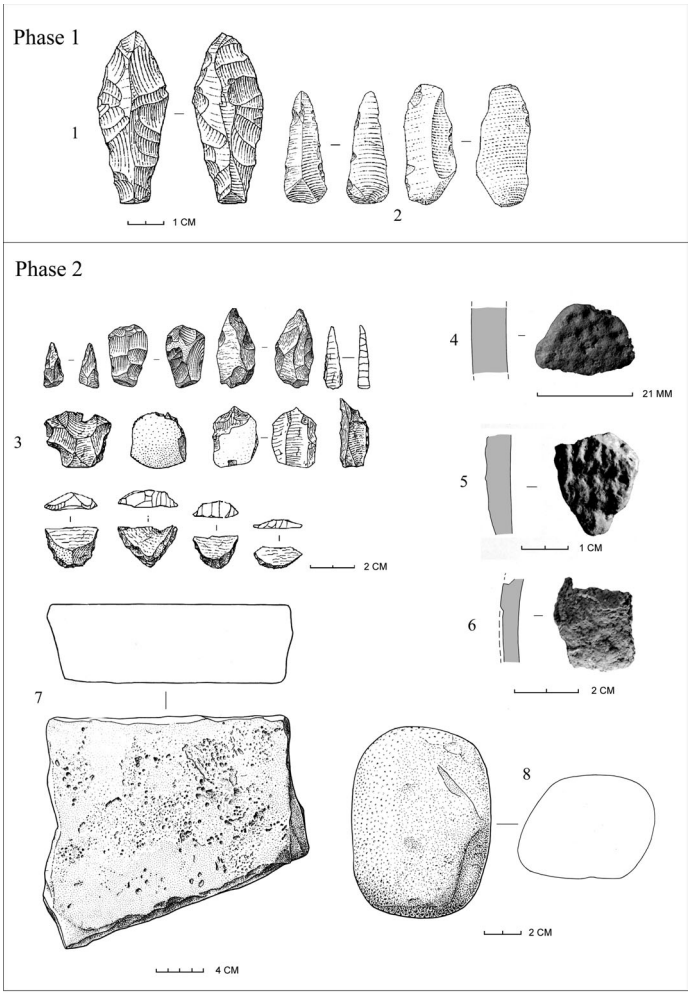

Figure 4. Artefacts assigned to Phase 1 and 2.

Table 1. Lithic industries at the beginning of the Holocene

Site	Phase	N_{tot}	Reduction techniques					Tools						
			Single platform	Double platform	Bipolar	Multi-directional	Radial	Retouched flakes	Bifacial points/flakes	Backed points	Geometrics	Borers	Scrapers	Core-tools
Ravin de la Mouche	1	62	3	2			1	15	2					
Ravin du Hibou	2	833	4			2		14	7				2	
Damatou mou	2	15995	170	56	62	9	4	42	1	5	28	21	1	15

Phase 2 (Eighth millennium BC)

Phase 2, defined at the sites of *Ravin du Hibou* (*Gully of the Owl*) and *Damatoumou*, follows phase 1 without any obvious hiatus or other sedimentary break. In a depositional context indicating a strong hydrologic capacity and, indirectly, a still relatively intense rainfall, the fill of a large channel at the *Ravin du Hibou* (H3b; Figure 2) shows finely bedded muds alternating with levels relatively rich in charcoal within a sandy matrix 1.8 m thick. This may indicate a desire to control the environment by the use of fire beginning in phase 2. The surrounding vegetation is savannah, with the presence of *Detarium,* as well as a gallery forest with *Syzygium*. Five radiocarbon dates place this assemblage between 7810 and 7030 BC (Figure 3), endorsed by an OSL date of 9.42 ± 0.41 ka (MAL 00/5/4). At *Damatoumou*, the site covers 560 m^2 at the top of the Neolithic terrace and is found in a formation that marks the reworking of aeolian silts deposited during the arid Ogolian. The primary stratigraphic position of the human occupation could be determined: within a red sandy silt highly eroded at the summit and dated by two radiocarbon dates on burned straw between 7480 and 7080 BC.

These two sites have yielded lithic material, but are differentiated by location and function (Figure 4; table 1). The *Ravin du Hibou*, on the banks of the river, had only a small lithic assemblage associated with ceramics and grinding implements; its main function was clearly *not* lithic tool production. *Damatoumou*, in contrast, is more extensive and situated on a terrace, and had a much more substantial lithic assemblage with no ceramics or grinding implements, and thus seems to have been devoted only to lithic reduction activity (Raeli *et al.* 2001). Quartz is the main raw material used, while sandstone and flint are present in lesser quantities. Reduction took place *in situ*, as indicated by the high proportion of debris less than one cm. All products from the different stages of the *chaîne opératoire* (debris, cores, flakes, tools) are cortical: a specific decortication phase of the core did not exist. Unidirectional reduction predominates, but other methods, notably bipolar-on-anvil or multidirectional, were also employed. Some tools were retouched by pressure. The typological range, strongly microlithic (average length 25mm), mainly includes retouched flakes, but also includes a more specialised toolkit: geometric microliths, awls, fusiform and trapezoidal bifacial armatures, and backed points. The presence of a macrolithic toolkit of massive *rabots* exclusively on sandstone reveals the differential exploitation of lithic raw materials.

Several ceramic sherds (Figure 4.4-6) were discovered during stratigraphic excavation of the H3b assemblage of *Ravin du Hibou*. Their thickness varies between 4 and 13 mm, but the degree of breakage prevents any attempt to reconstruct the original forms. All have quartz temper, while two also have particles of oxidised sandstone and one with grog. Two sherds permit identification of distinct decoration motifs: a rolled impression, probably made by cord wrapped cord roulette (Figure 4.5), and a simple impression by a toothed comb (Figure 4.4). A large fragment of a sandstone millstone and a complete cylindrical grinder, found at the base of the H3b deposit, evidence the use of grinding implements in phase 2 (Figure 4.7-8).

Phase 3 (Fifth-fourth millennia BC)

A hiatus in human occupation and in the sedimentary record seems to have followed phase 2. Only the site of *Promontoire Néolithique* (Neolithic Promontory: 'Promontoire' on Figure 1) provides evidence for human occupation during the fifth and fourth millennia BC. To

complement other investigations across the site, data on the environmental context have been collected from the archaeologically sterile site of *Termitière*. The site of *Promontoire Néolithique* was discovered in the upper part of a sequence of fine red reworked loess, dated by OSL to 6.1 ± 1.3 ka (MAL 00/1/5). On the opposite bank, the site of *Termitière* contains fine deposits dating to the end of the fourth millennium BC, between 3240 and 3100 BC which are rich in organic material and charcoal. The sedimentary hiatus between phases 2 and 3 could reveal either relatively minor alluvial accumulation, reflecting hydrological changes, or erosion associated with substantial drainage during the Middle Holocene. Anthracological analyses indicate gallery forest with *Syzygium* dominant and the presence of *Uapaca* on the edges of the river. The interpretation of palynological taxa from organic-rich drained soils permits the reconstruction of a large scale mosaic landscape, dominated by savannahs with shea butter trees (*Vittelaria paradoxa*) and *Combretaceae*, alternating locally with open forests with *Isoberlinia* woodlands, and perhaps even dry forests. Moreover, we note evidence for the regularity of generalised fires, probably of human origin, which could explain the open character of the landscape. An initial sample of tools on quartzitic sandstone at *Promontoire Néolithique* reveals the presence of a

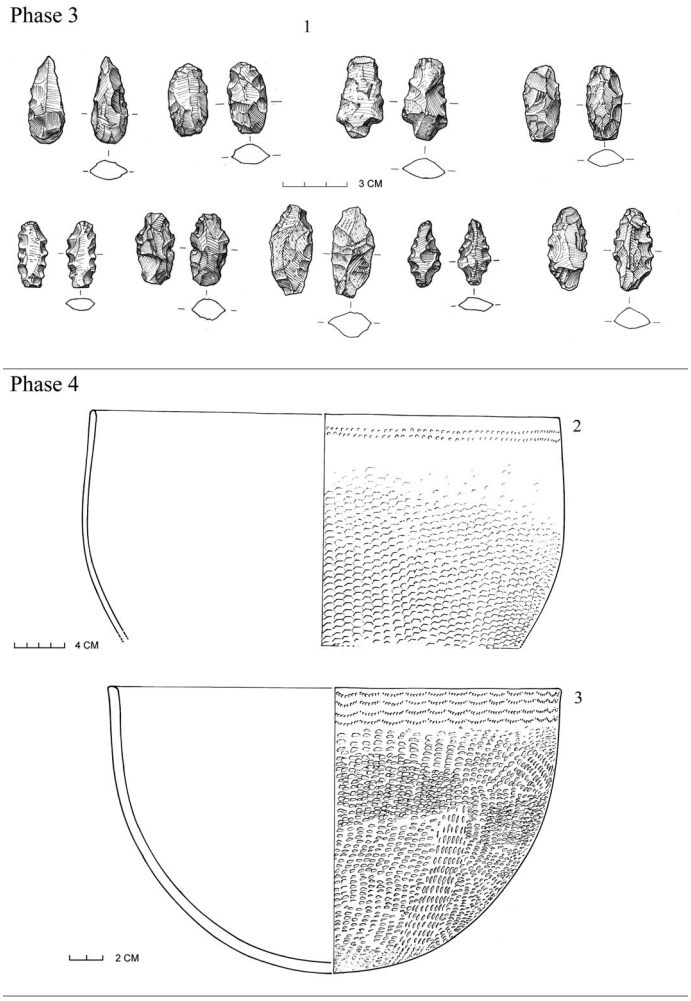

Figure 5. Artefacts assigned to Phase 3 and 4

Table 2. Distribution of armature types at the site of *Promontoire Néolithique* (surface).

Armatures	N	%
Foliates	65	79.3
Serrated edge	12	14.6
Tanged preform	3	3.7
Serrated edge +tang	1	1.2
Tanged	1	1.2
Total	82	100

workshop specialising in the production of projectile points with overall bifacial retouch which constitute 50 per cent of the toolkit and are whole, broken during the process of elaboration, or pre-forms (Figure 5.1; table 2, study by S. Kouti).

Phase 4 (Third millennium BC)

Several sites, including two well-dated ones (the *Ravin Sud* and the *Ravin du Hibou*), indicate that the occupation of the region was more dense beginning in the third millennium BC and that it is characterised by a new cultural unit. The site of *Ravin Sud* has important deposits rich in organic material, alternating with loose sand layers associated with a facies of calm waters while the ravine was progressively filled. A few hundred metres to the north, at the *Ravin du Hibou*, the phase 4 levels are composed of indurated coarse sands (H4) superposed directly on phase 2 deposits, corresponding to the bases of channels which indicate very active drainage (Figure 2). These sedimentary deposits, highly contrasting between sites, indicate that between 2700 and 2020 BC (Figure 3) there were sand deposits in a principal active channel migrating in the alluvial basin, and a finer sedimentation in the extensions of peripheral waters. Analyses of vegetal remains indicate that the banks of the Yamé sheltered a gallery forest with fewer southern affinities, including *Albizia*, *Syzygium* and *Alchornea*, situated in a general savannah environment, documented by *Lophira* charcoal and pollen from grasses, Combretaceae, shea butter tree, etc.

Archaeological material discovered in the H4 deposits at *Ravin du Hibou* probably comes from a habitation located nearby. We note particularly two hemispherical vases (Ø maximum: 28 and 38 cm) with a covering decoration, one probably made by cord wrapped cord roulette, the border being underlined by four rows of impressions by a curved roulette with eight teeth, of dotted wavy line type (Figure 5.3), the other made with a large twisted string roulette, the edge presenting a double row of points made with a comb (Figure 5.2). These ceramics contain, in addition to quartz temper, variable concentrations of sponge spicules. Finally, a millstone fragment found in the lower level of *Ravin Sud* confirms that grinding implements were used during this phase.

Phase 5 (Second millennium BC)

After a possible hiatus of some centuries, phase 5, defined at the site of *Varves*, covers the second millennium BC between 1740 and 1010 BC (Figure 3). It is characterised primarily by a radical change in the ceramic tradition. The site of *Varves* consists of alternating fine grey silty layers, very rich in organic material and archaeological objects, attaining a stratigraphic thickness of around two metres. The deposited sedimentary record indicates a reduction in the capacity of the Yamé and a change in sedimentation conditions. Upstream from the *Confluence*, a more or less regular alternating grey charcoal-rich silts and fine sands are deposits in the extension of stagnant waters, evidencing more sporadic flooding. A seasonal function is sometimes recognizable, but it remains difficult to interpret the geometry of the deposits. Long-term sedimentation seems to be in accord with a progressive filling of the valley floor, increasingly prograding downstream, and a regular reduction of permanent water surfaces. Three broad stratigraphic units have been observed, of which the first two (5a and

5b) contained archaeological material. Pollen and archaeobotanical analyses indicate the importance of herbaceous plants, and more particularly large grasses, observable in the form of culm stubble and carbonized rhizomes. On the edge of the Yamé, the gallery-forest with *Syzygium* and *Alchornea* observable in phase 4 persists in unit 5a, with the presence of a bamboo, *Oxytenanthera abyssinica*. We note in contrast the appearance on the savannah of taxa with more Sahelian affinities, such as *Bauhinia*, *Guiera* and *Combretum* cfr *micrantum* and numerous cores of *Parinari* sp., a fruit typically consumed by humans. The layers of unit 5b reveal that the gallery-forest continued to the end of the second millennium, while *Terminalia glaucecens* and *Daniellia oliveri* were found on the savannah. Globally, the change in vegetation observed between phases 4 and 5 seems to indicate an aridification of the landscape, developing toward a Sudano-Sahelian savannah with extrazonal taxa that persist, such as *Syzygium*. The importance of the ashy microremains indicates the frequency of large fires, quite probably anthropogenic.

Several stone structures were excavated at the *Varves* site. These were made of sandstone flagstones, probably squared off, with dimensions between 30 and 40 cm, and were levelled. They likely demonstrate the seasonal occupation established on the banks of the Yamé, on the periphery of permanent villages identified during survey at higher altitudes. Ceramics and grinding implements dominate the archaeological assemblage. The limited number of quartz flakes do not really characterize a lithic industry. In general, the ceramic series is fairly homogeneous, with respect to the texture of the clay, mainly tempered with quartz and grog, as well as to the decoration. Apart from a sherd with incisions made with a stick (Figure 6.1), all decorations identified were formed by roulette impressions (Table 3). For the forms that could be reconstructed, we note mugs, including one with a slightly convex rim profile, and large globular vases with incurving rims (Figure 6.2). Numerous upper grinding, millstones and millstone fragments of sandstone, as well as grooved stones, have been discovered in habitat structures (Figure 6.3). Four complete millstones have nearly identical morphometric characteristics, and several are decorated on the back with polished grooves (Figure 6.4).

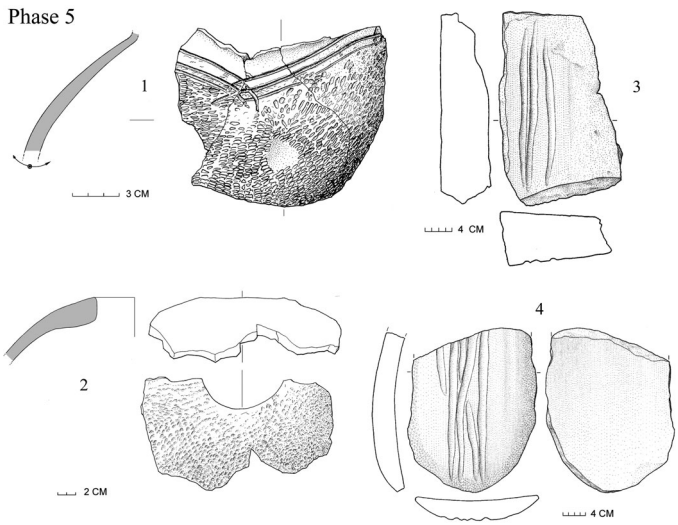

Figure 6. Artefacts assigned to Phase 5

Table 3. Ceramic decoration techniques: distribution of the different types of tools identified for assemblages 5a and 5b, and the total of the ceramic assemblage at the site of the *Varves*.

Decoration	Assemblage 1		Assemblage 2		Total site	
	N	%	N	%	N	%
None	32	42.1	28	50.9	60	45.1
Corded traces	12	15.8	11	20.0	24	18.0
Cord wrapped stick	16	21.1	4	7.3	20	15.0
Simple roulette	7	9.2	5	9.1	12	9.0
Cord wrapped cord	6	7.9	3	5.5	10	7.5
Braided cord	2	2.6	3	5.5	5	3.8
Knotted cord	1	1.3	0	0.0	1	0.8
Baguette	0	0.0	1	1.8	1	0.8
Total	76	100.0	55	100.0	133	100.0

The Holocene sequence of Ounjougou in its West African context

The beginning of the Holocene

As many sites in the Sahara demonstrate, humans mastered ceramic technology at least as early as the ninth millennium BC, notably in Niger at Tagalagal and at Adrar Bous 10 (Close 1995; Roset 1996). These ceramics most often have overall decoration made by cord wrapped cord roulettes and sticks, among others; those at Tagalagal already reveal a great variety in motifs and techniques. From the end of the ninth and beginning of the eighth millennium BC, ceramics are also found in Libya at Ti-n-Torha or Uan Tabu, and in Algeria, at Site Launey and Amekni (Barich 1974; Camps 1969). The diversity in decoration techniques is confirmed, as in a single level at Amekni we find incisions, piercings and pivoting or normal impressions, the motifs being made by comb or cord wrapped cord and cord wrapped stick roulettes.

In contrast, the earliest ceramics in the sub-Saharan area appear in the sixth millennium BC in Cameroon at Shum Laka or in Nigeria at Konduga, then at the turn of the fifth and fourth millennia in Mali at Kourounkorokale and in Ghana at Bosumpra (Lavachery 2001; Wotzka 2001; MacDonald 1997; Shaw 1985). The decorations include impressions with simple rocker combs or cord wrapped stick roulettes, and sometimes with incised geometric motifs. The ceramics of Ounjougou, also decorated with flexible counter-wrapped cord roulette and toothed comb, and dating back to at least the eighth millennium BC, are thus the oldest in the sub-Saharan world, and are contemporaneous with the Saharan dates. However, no ceramic indicator is currently known between the regions of emergence in the Sahara and our site complex. The first ceramics of the Malian Sahara, although presenting certain decorations described above, only appear at the end of the seventh millennium for the facies at Oumm el Assel and Hassi-el-Abiod, or even at the end of the sixth or fifth millennia BC for other cultural assemblages (Raimbault 1990, 1996). In the Central Sahara, millstones and grinders are known from the beginning of the ninth millennium BC in Niger at Temet, with stone receptacles, and during the ninth and eighth millennia BC at several sites in Niger and Libya, with the use of ceramics (Roset 1996; Barich 1974). In contrast, in the southern Sahara, this type of material seems to appear only at the turn of the fifth and fourth millennia BC in Mali at Kourounkorokale, and from the second millennium BC at numerous sites in

Mali, Burkina Faso, Nigeria and Ghana (MacDonald 1997; Anquandah 1993). Once again, grinding implements at Ounjougou, appearing in the eighth millennium BC, are the oldest in the Subsaharan world. By their dimensions and intentional and careful shaping, the millstone and the grinder at Ounjougou are clearly distinguished from Pleistocene material, but have strong resemblances with the millstones for grasses and the associated grinders known in West Africa (Schär 2002).

The Saharan lithic industries are distinguished by clearly laminar reduction, with the preferential use of raw materials such as flint, schist, rhyolite or jasper, but quartz only rarely (Aumassip 1986; Di Lernia & Cremaschi 1996; Gaussen & Gaussen 1988; Raimbault 1990). The typological range is often dominated by retouched blades and/or Ounan points, particularly in the different facies in northwest Mali and at several Nigerian sites, even if backed points, geometric microliths and bifacial armatures are present. These last are particularly diverse here and the characteristic types are not found further south. In the sub-Saharan zone, by contrast, following the Pleistocene-Holocene transition, the industries are often hardly laminar and quartz was used as the main raw material. The characteristic typological range consists of geometric microliths, awls, backed points, and rare flakes or points with bifacial retouch, sometimes associated with a macrolithic component. This "West African microlithic technocomplex" (MacDonald 1997) includes sites such as Iwo Eleru and Rop in Nigeria, Bingerville on the Ivory Coast and Shum Laka in Cameroun (Shaw & Daniels 1984; Rosenfeld 1972; Chenorkian 1983; Lavachery 2001).

The lithic industries of phases 1 and 2 at Ounjougou clearly belong to this southern complex, although the bifacial fusiform points find comparison only at the contemporaneous site of Temet in Niger (Roset 1996). In the Central Sahara, only the *Early Acacus* facies, present in Libya between the tenth and the beginning of the eighth millennium BC, shows a substantial use of quartz, similar to the Ounjougou industry, with the same tendency toward "hypermicrolithization", the backed pieces being more frequent and bifacial armatures absent (Garcea 1997; Di Lernia 1999).

The Middle and Late Holocene

The types of projectile point typical of phase 3 at Ounjougou are frequently found in the Sahara beginning with the Middle Neolithic, as well as in Mali during the third millennium BC in *Facies K* at Tilemsi, and in the second millennium BC in the *Windé-Koroji facies* at Gourma, a cultural complex that seems itself to have originated from the Tilemsi (Smith 1974; Gaussen & Gaussen 1988; Mac Donald 1996a). While remaining cautious, the Ounjougou industry can thus be considered to be older, the date from the *Promontoire Néolithique* as yet unique.

The hemispherical vases of phase 4 at Ounjougou, by their form and distribution of decoration, are commonly found in various contexts of the Saharan Neolithic, the most southerly examples being observed principally at Tilemsi during the third millennium BC at the site of Karkarichinkat (Smith 1974). Further to the south in Burkina Faso, and slightly after the turn of the third and second millennia BC, the site of *Pentenga* has also yielded a nearly identical vessel (BF 89/1), as well as pivoting comb impression decorations, in horizontal bands or in wavy lines, sometimes combined with different impressions on the body (Breunig *et al.* 1991; Frank *et al.* 2001; Wotzka *et al.* 2001). Ceramic decorations similar to those at

the *Ravin du Hibou* are also found during the second millennium BC, again in Burkina Faso, in Neolithic contexts at *Ti-n-Akof* (Vogelsang 2000). Finally, the very specific temper of sponge spicules is observed during the second millennium at several Sahelian sites, mainly in Mali, in the *Gourma facies* and at the site of *Kobadi* in the Méma (McIntosh *et al*. 1989). The characteristics of the ceramics of phase 5 at Ounjougou, mainly the bowls and globular vessels, as well as the twisted string, cord wrapped stick or cord wrapped cord roulette impressions, bring to mind the levels at the end of the third and second millennia BC at *Windé Koroji* in Mali and at Rim II in Burkina Faso (Mac Donald 1996a; Andah 1978). Finally, further east of Niger, the ceramics of *Kirkissoy I* (1410-750 BC) also show important similarities, notably twisted string or cord wrapped cord roulette decoration (Vernet 1996a, b).

Synthesis

The climatic history, reconstructed at Ounjougou from sedimentary and botanical data, is characterised over the long-term by a tendency towards aridification after an optimum during the Middle Holocene, and sees a succession of communities distinguished principally by their material culture. It is in a context of increasing rainfall, likely during the tenth millennium BC, that a new population came to inhabit Ounjougou, using tools that demonstrate similarities, both technological and typological, to the more southern industries of the "West African microlithic complex". Beginning in the eighth millennium BC, still within a

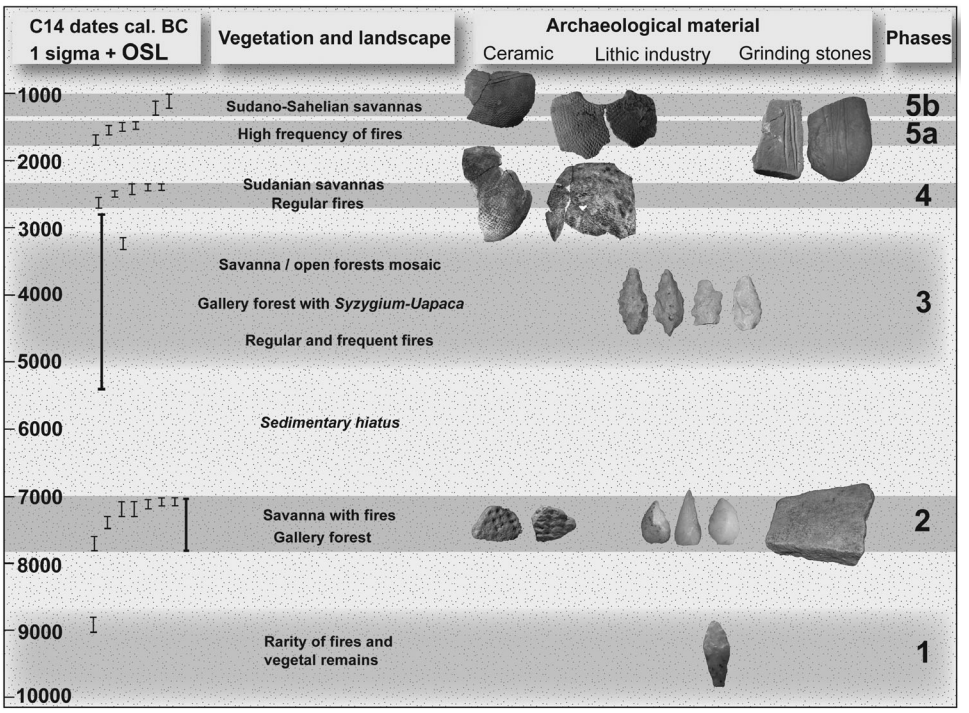

Figure 7. Model for the Ounjougou sequence.

substantially rainy climate that sees not only the establishment of a savannah combined with a gallery-forest, but also a clear willingness to master the environment by the use of fire, this population had already adopted ceramic and grinding implements. These elements of the material culture, which would remain lacking further to the south for another several millennia, suggest links between Ounjougou and the Saharan zone – links that remain to be clarified.

In the specific environmental context of the Dogon Plateau, Ounjougou can thus be placed at this period in a zone overlapping two cultural entities, one centred around Air, Ténéré and Acacus, and the other in the tropical forest. Some comparisons established with the *Early Acacus* culture of Libya could be the result of convergence due to the exploitation of the same raw materials and practice of the same mode of subsistence also characterised by the beginning of ceramic production and the preparation of wild cereals. After a hiatus in occupation between the seventh and fifth millennia BC, Ounjougou reflects possible contacts with northern cultural groups during the environmentally favourable period of the fourth millennium BC. During the third millennium BC, elements of Saharan affinity are observed in the typological and technological ceramic traits, both at Ounjougou and other sites over a broad geographic area. This situation is probably the result of migrations and/or cultural influences associated with the beginning of modern aridity. Two principal vectors of diffusion can be distinguished. The first, by the Malian Sahara, would follow the progressive retreat of the Interior Niger Delta, while the second would pass by the Tilemsi and south-western Niger, following the river, subsequently diffusing across the Gourma or the Séno plain, in the direction of the Dogon Plateau and Burkina Faso. These two vectors could be explained by the natural obstacle that still constituted the Interior Niger Delta at this period. Exchanges or displacements of lesser importance on the margins of the Delta would not have been impossible, and could explain the heterogeneity of material cultures during the second millennium BC. During this time the *Windé Koroji* facies seems to have originated in the Tilemsi, while the proximity of the *Gourma* facies seems rather to have belonged to the Kobadi tradition. In parallel, within the context of major environmental changes during the second millennium BC and the appearance of agriculture, cultural attributes disconnected from Saharan influences seem to have appeared in a savannah environment, as indicated by the observed similarities between the ceramic assemblages of Mali, Niger and Burkina Faso, notably between the site of the *Varves* and those of *Kirkissoy* and *Rim*.

The interdisciplinary approach employed at Ounjougou in the framework of the program *Paléoenvironement et peuplement humain en Afrique de l'Ouest* reveals an interesting example of the development of a complex system of relationships between humans and their environment, demonstrating important changes during the Holocene.

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