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Population dynamics and Paleoclimate over the past 3000 years in the Dogon Country, Mali

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Abstract

This paper reviews the issue of the peopling of the Dogon Country (Mali) and surrounding regions over the past 3000 years, taking into account the influence of Sahelian paleoclimatic variations as well as archaeological, ethnoarchaeological, and historical data. The integration of all these elements is important in order to understand the conditions of settlement in this region now listed as part of UNESCO's natural and cultural world heritage. The new archaeological, ethnohistorical, and ethnoarchaeological data presented here were gathered through the international pluridisciplinary research program "Paleoenvironment and Human Population in West Africa" begun in 1997. This program is centered on the study of Ounjougou, an area located in the Yamé valley on the Bandiagara Plateau. It includes numerous archaeological sites exposed by recent erosion processes, indicating the presence of human populations from the Lower Paleolithic to present times.

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In 1989, the Dogon Country was listed as part of UNESCO's natural and cultural world heritage (Cissé, 2003). The fame of this region results the well-known French ethnographic research initiated from 1931 by M. Griaule and his team in some of the villages of the Bandiagara escarpment (see for example Dieterlen, 1941; Griaule and Dieterlen, 1965; Griaule, 1938, 1948; Paulme, 1940). Concentrating notably on the cosmog-

ony of the Dogon, this work, although currently criticised on many points (Van Beek, 1991; Bouju, 2003), had a great influence on the Western view of African populations. Subsequently, in the 1960s and 1970s, a Dutch team made the first steps towards understanding this region's past with the discovery of very well-preserved material remains in the caves of the escarpment (Bedaux, 1972, 1974, 1991; Bedaux and Lange, 1983). These remains attest for three different cultural occupations, the first termed *Toloy*, at some point during the 1st mill. BC, the second termed *Tellem*, starting in the 11th century AD, followed by the current *Dogon* population in the 16th century AD, a date that will be discussed

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further. For a decade now, a new generation of researchers in the human and natural sciences has revisited and renewed the view on the settlement history of this region.

Our research was undertaken within an international and pluridisciplinary research program “Paleoenvironment and Human Population in West Africa,” begun in 1997.¹ This program is centered on the archaeological site-complex of Ounjougou, discovered in 1994 on the Bandiagara Plateau (Figs. 1 and 2). These sites present sedimentary sequences exposed by recent erosion phenomena, yielding evidence of human occupations partly associated with well-preserved paleobotanical remains. The chronological record represented is exceptionally long, since it covers the period from the Lower Paleolithic to present times, and changes our understanding of the dynamics of settlement in this region. We develop here only the data from the Iron Age and Historic eras, earlier periods being the subject of other articles.²

In the context of Subsaharan Africa, the geographic position of the Bandiagara Plateau, on the edge of the famous historical Empires of the Niger Bend (Fig. 1), has conferred a very specific role to this region in pre-colonial geopolitics. In the neighboring regions of the Dogon Country, phenomena as fundamental as the adoption of iron metallurgy, urbanization, caste specialization, long distance trade, formation of political hegemonies, and Islam were developed over a period of 3000 years. But what were the influences of these developments on the settlement of this rocky Plateau? And how were natural and cultural contingencies combined to explain the occupation or abandonment of a region so favorable in terms of natural protection, but so difficult to exploit economically? These essential questions guide our discussion.

The first model for the Dogon settlement dynamics was based on correlations between the spatial expansion of ceramic traditions and the actions of the surrounding Empires (Gallay, 1994; Gallay et al., 1995). Following new fieldwork, we propose a scenario for the settlement of the Dogonland extended spatially and temporally, that integrates climatic and environmental variation, essential to the understanding of the modalities of occupation of this sensitive Sahelian zone.

¹ Coordinated by E. Huysecom (Univ. of Geneva), this project is currently carried out in collaboration with researchers from the following institutions: Malian (Univ. of Bamako, Institute of Human Sciences in Bamako and the Cultural Mission of Bandiagara), Swiss (Univ. of Geneva and Fribourg), French (Univ. of Paris X-Nanterre, Caen and Rouen), British (Univ. of Oxford) and German (Univ. of Frankfurt).

² For more detailed information on the early periods, see Huysecom (1996a, 2002); Huysecom et al. (1999, 2000, 2001, 2002, 2004a, 1998, 2004b,c, in press); Ozainne et al. (2003); Raeli and Huysecom (2001); Rasse et al. (in press); Robert et al. (1999, 2003); Soriano (2003).

The climatic background of the Dogonland settlement systems

The Dogon Country is situated in the Sahelian zone and characterized by a tropical climate influenced by monsoons. The year is divided into dry and wet seasons, the latter lasting 3–4 months, with an average of 30 days of rain. At Bandiagara, the yearly average rainfall is not more than 500 mm and the temperature is between 28 and 29 °C. The vegetation cover reflects such a climate and the Dogon Country is today a wooded or shrub savannah with grass cover that is subject to local bush fires (Nouaceur, 2001). But these climatic and environmental characteristics varied substantially over time.

Up to now, sediments rich in micro and macro vegetal remains of Ounjougou document the periods of the Early, Middle, and Late Holocene to 1000 BC. Vegetation changes observed over the 2nd millennium BC seem to indicate a desiccation of the landscape, developing toward a Sudano–Sahelian savannah that is subject to bush fires each year. Unfortunately, the sediments corresponding to the Final Holocene discovered to date were affected by oxidation phenomena that destroyed the vegetal remains. Continued fieldwork will perhaps lead to the discovery of sediments favorable for the precise reconstruction of environmental conditions of the last three thousand years on the Plateau. It is now necessary to rely on data collected elsewhere, but before presenting a general outline of such variation, several methodological points must be discussed.

The broad African paleoclimatic trends are generally known from marine sequences that have provided oxygen isotope curves (¹⁸O), as well as several other proxies (sedimentology, pollen sequences, micropaleontology, etc.). For the Late Holocene, the difficulty resides in the fact that no marine core has sufficient resolution to permit correlation with cultural breaks, which occur on the scale of a few centuries or even less. The continental sequences offer such precision, but these are valid only at a local level and may contain gaps or discontinuities. One must therefore avoid their use in large-scale paleoenvironmental reconstructions and be satisfied with phenomena of regional validity, in this case the Sudano–Sahelian region. Such phenomena, the evidence for which is preserved at certain favorable sites, reflect short-term variations in factors determining fluctuations in matter and energy (hydric balances, dynamics of vegetation cover, morphodynamic processes, etc.). Their correlation to global events is then analyzed to produce careful interpretations. The ancient vegetation diversity and the frequency of mosaic structures refute schemas based on simple and uniform determinism (Ballouche, 2002, p. 241). We should particularly highlight the necessary approach to the problem at different spatial scales, from bioclimatic zone (Sahara, Sahel, Sudan...) to biotope (escarpment, dune, pond...).

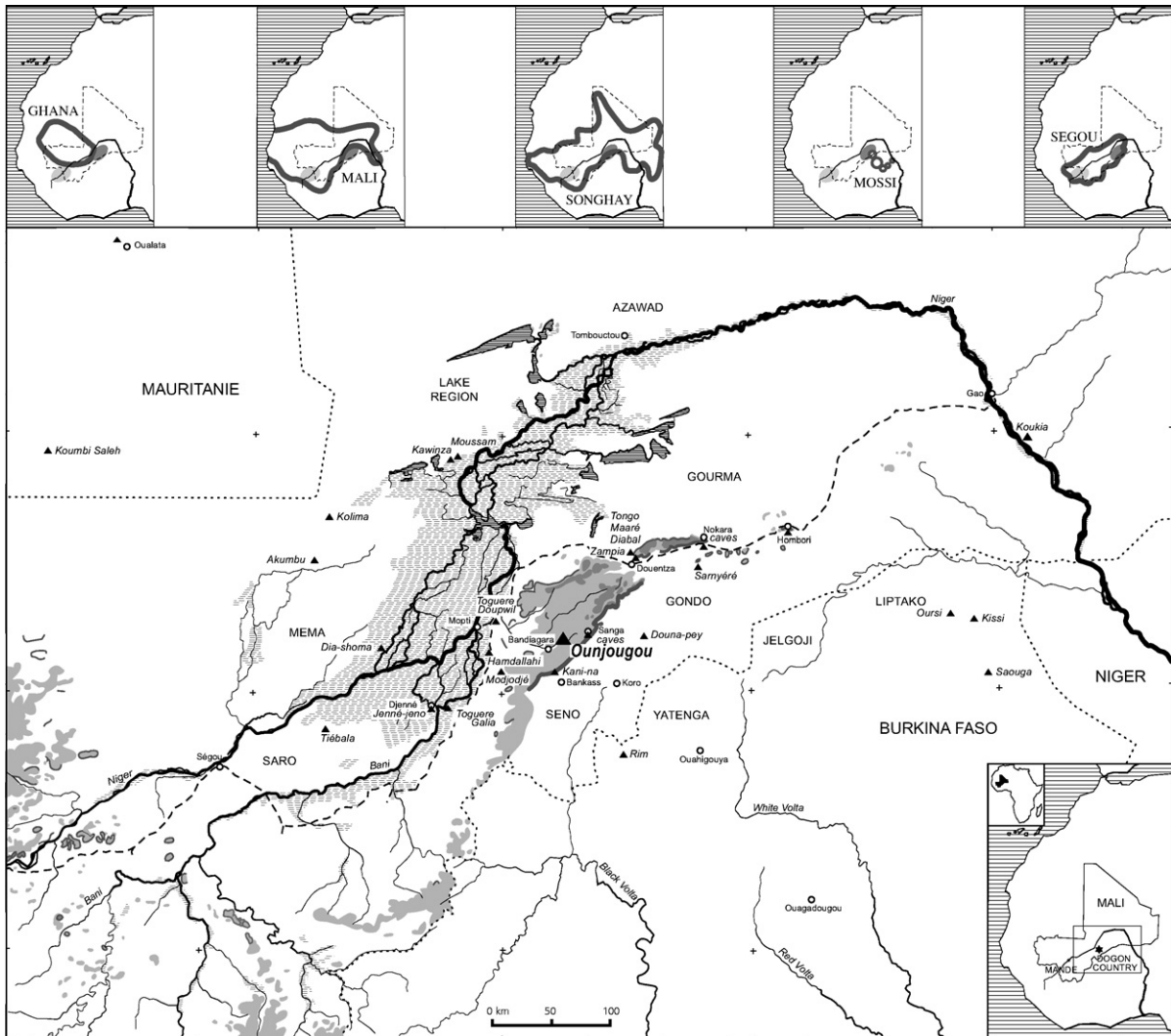


Fig. 1. Regional map indicating the maximal expansion of historic Empires and the location of the main archaeological sites mentioned.

Moreover, it should be made explicit that there are very few proxies, for which the paleoclimatic references are direct. Climatic reconstructions are generally based on the evaluation of paleoecological data through the filter of multiple interpretations that can be more or less subjective. Yet, for the period addressed by this study, the importance of anthropic factors in environmental dynamics is incontestable (Ballouche, 2002). For example, the regressive dynamics of Sudano-Sahelian vegetation cover at the scale of the last three thousand years, generally termed “landscape aridification,” raise numerous questions in terms of interpretation of the environment and its operation. The retreat of forest formations, wooded or mixed, and their qualitative transformations leading to xerophile, open formations

entails a degradation of the hydric balance, soil destabilization, and multiple processes of erosion. This development could be explained by climate breaks, but may also result from more complex processes where different anthropic practices could become dominant, with environmental effects comparable to those of climatic aridification. It is thus useful to distinguish indicators specific to climate effects from those of anthropic activity, and then to rank them in order to determine their respective roles. The two kinds of factors and their impacts can be linked, either neutralizing or synergistic.

Finally, it is constructive to distinguish major regional, or even global, climate breaks, from local readjustments. Whether it is a question of broad research or more specific studies (sedimentology, geochemistry,

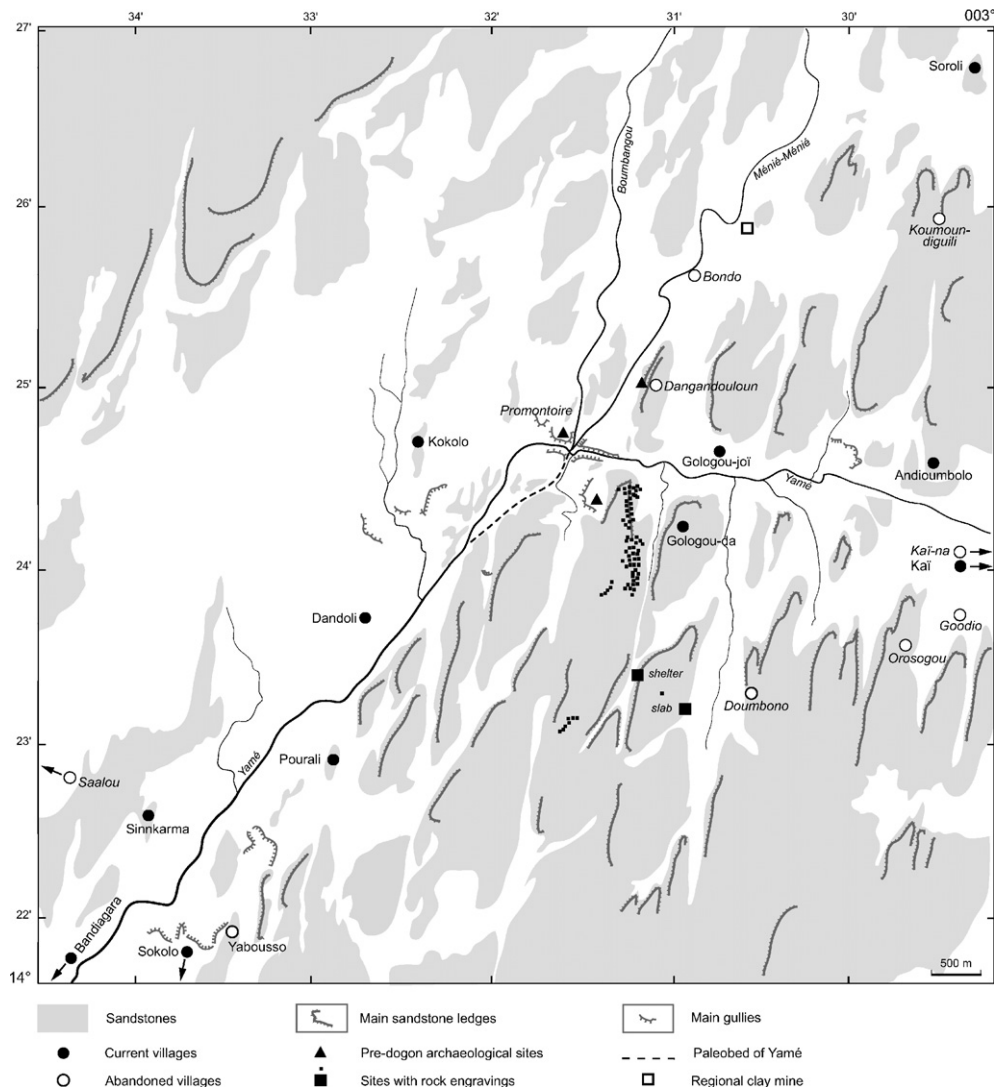


Fig. 2. Map of the area of Ounjougou, showing the pre-Dogon and Dogon sites studied.

lacustrine levels, Aeolian dynamics, and biocenosis), it is agreed that a major climate break occurred at the beginning of our period of reference, that is the last 3000 years (Alexandre et al., 1997; DeMenocal et al., 2000; Hassan, 1997; Lézine, 1989; Lézine and Casanova, 1989; Vernet, 1996). Keeping in mind that climatic changes are known by their impact on the environment, we can state that several elements document a trend to increasing aridity during the 3rd–2nd millennia BC, at the end of what is termed the “African Humid Period.” An abrupt and early climate break can be noted from 3500 BC in the Sahara (DeMenocal et al., 2000), but further south, it occurred much later. Hydrological functioning of Sahelian lakes demonstrates an increasing trend to drying between 1400 and 1000 BC (Ballouche and Neumann, 1995; Lézine and Casanova, 1989; Maley, 1981; Salz-

mann and Waller, 1998). At this time, the dune fields in the Malian Gourma between Douentza and Timbuktu were reactivated (Stokes et al., 2004).

The forms of this climate change—reduction in rainfall totals, changes in the annual precipitation distribution, lengthening of the dry season or degradation of the local hydric balance—are, by all evidence, multiple, which can explain its shifting occurrence in time. In all cases, over the course of the 1st millennium BC, the climatic situation became much less favorable than any known in Sudano-Sahelian Africa since the beginning of the Holocene. However, while there is no doubt that this period was marked by a climate break that impacted the environment and transformed the vegetation formations over the long term, it was also marked by the emergence of complex agro-pastoral cultures in several areas

of the region, from Mauritania to Lake Chad (Ballouche, 2002; Breunig and Neumann, 2002b; Murray, 2004; Neumann, 1999).

For the historical period, natural sciences data are rare and come primarily from studies of variation in the level of Lake Chad (Maley, 1981) or ponds deposits, such as at Oursi and Kissi in northern Burkina Faso (Ballouche, 1998, 2001; Ballouche and Neumann, 1995) as well as in Lake Bosumtwi of Ghana (Russel et al., 2003) and in the Manga Plains of Nigeria (Salzmann and Waller, 1998; Salzmann et al., 2002). Very recently, a study of the Malian dunes of Gourma, based on a series of OSL dates, has yielded new data (Stokes et al., 2004).

Certain naturalists rely on historic events to reinforce, or even determine, their paleoclimatic interpretations (Maley, 1981; Reichelt et al., 1992). It is thus important to avoid arguments that can become circular without supplementary data. This appears to have been the case in the synthesis of regional paleoclimatic data published by McIntosh (1998, 2000), presented as an average curve constructed from different kinds of data concerning a large geographic area. We present this curve for information (Fig. 12), but insist on discretion in its use, given the methodological problems presented above. This curve nevertheless gives a broad idea of the Sahelian climatic variations, albeit poorly documented. Considering the pre-Dogon and Dogon settlement, we can detail two main periods:

A humid optimum period (300/400–1000/1100 AD)

After McIntosh (1998), the Inland Niger Delta is characterized by an “expansion of distributary systems.” Lake Chad shows a minor positive pulse at the beginning of the period that permitted the sporadic outflow of the Bahr el Ghazal to the north of the lake and even the development of sizeable marshes in the Djourab (Maley, 1981). In the Manga Plains of Nigeria, the salinity in the pools of the Kajemarum oasis seems to have diminished during at least the first half of this period (Salzmann and Waller, 1998). Reichelt et al. (1992) consider that this period, contemporaneous with the Ghana Empire, was distinctly more humid than today and during the period preceding it. Around the 10th century, Reichelt (1977) reports 300 important hydraulic systems associated with pastoralism in the Malian Gourma. According to him, for these systems to be functional, there would have had to have been annual precipitation on the order of 800 mm, more than double of that today. Such quantities appear to be excessive, however, because they would imply dense Sudanian vegetation that is not at all supported by the data. The site of Saouga, in northern Burkina Faso, clearly shows the presence of some Sudanian elements, like the shea nut tree, around 1000 AD, but in a Sahelian floristic context (Neumann et al., 1998). This period does, however, mark a humid pulse between two drier periods.

An unstable period with progressive aridification (1000/1100–1800 AD)

Following this favorable period, a continuous trend towards aridification starts at the beginning of the 11th century AD, despite multiple oscillations (Reichelt et al., 1992). It is marked, among others, by a regression in the level of Lake Chad and a stop in the functioning of the Bahr el Ghazal, as well as the start of Aeolian activity in the 12th century AD (Maley, 1981). These authors also base their conclusions on a general displacement of populations towards the south, notably in the context of the Soninke diaspora, to support their conclusions.

According to R. McIntosh’s curve (Fig. 12), the period between 1500 and 1800 AD shows a clear climatic improvement. It is described as characterized by abundant rains, interspersed with several severe droughts documented by local chronicles (Tarikh es-Soudan, Tarikh el Fettach, and others), particularly for the 17 and 18th centuries. According to local oral and written sources, floods with catastrophic consequences and an increase in illnesses, such as the plague and malaria, are documented at certain times (Cissoko, 1968), while at other times droughts caused famines, often accompanied by epidemics that seem to have had severe demographic consequences (Gado, 1993).

Yet, in contrast to this schema, a certain number of evidences suggest an accentuation, from the 15th century on, of the earlier aridification. Reichelt et al. (1992) and Maley (1981) emphasize the continuation of population movement towards the south. In northern Burkina Faso, at Oursi (Ballouche and Neumann, 1995) and at Kissi (Ballouche, 2001), the retreat of savannah formations, as well as the degradation of the riparian banks along the ponds, are clear but the cause—climatic desiccation or anthropic desertification—cannot be isolated. It is also at the time, 600–500 years ago, to which Stokes et al. (2004) date by OSL a reactivation of the dune fields in the Timbuktu region. Variations in the level of Lake Chad, as reconstructed by Maley (1981), permit identification of two parts in this phase: the first (15–16th centuries) marked by significant regressions, and a second in the 17th century during which the lake recovered levels comparable to those during the 1st millennium AD. The climatic instability of this period can be compared to the contemporaneous “Little Ice Age” occurring in the middle latitudes.

Ethnohistory, social memory, and settlement dynamics

The surrounding pre-colonial empires

Understanding of the last period of the long human history of Ounjougou is supported by the integration of

historical data, both oral and written, concerning the pre-colonial Empires in the Niger Bend, and of the peoples linked with them. The history of the Western Sahel zone is very rich and benefits from abundant written data, unlike many southern regions in Africa. Texts are principally those of Arab chroniclers writing between the 9th and 15th centuries AD (Cuoq, 1985; Levzion and Hopkins, 1981), or scholars active in Timbuktu during the 16th and 17th centuries AD, responsible for the *Tarikh es Sudan* and the *Tarikh el-Fettach*.

8–12th c. AD, Ghana Empire

The capital, Koumbi Saleh (called Ghana in written sources), was located at today's border between Mauritania and Mali, a little more than 500 km west-northwest of the Dogon Plateau (Fig. 1). It is widely accepted that the Soninke, a group resulting from interbreeding between populations from the southern Sahara, the Sahel and the Niger Valley, founded this first state formation (Diallo, 1993; Dieterlen et al., 1992). The collapse of this Empire generated a large diaspora towards the River Niger.

718–16th c. AD, Dia (*Za or Ja*) dynasties and Songhay Empire

The hegemony of Dia dynasties was organized at the beginning in the 7–8th century AD, from a proto-Songhay people of multiple components, along the River Niger around Koukia. Traditions mention a mixed substrate of Voltaic farmers (Kurumba, Gulmance), Do and Sorko fishermen, Gaw hunters, and Mandinka immigrants from the west; specialized food-producers thus complement traders and warriors. The Songhay language, belonging to the Nilo-Saharan linguistic phylum, emphasizes the Saharan and eastern component of this population (Dramani-Issifou, 1993). Several emperors tried to conquer the Dogon Country during the 16th century and their occupation of the Inland Niger Delta generated several waves of refugees to the Bandiagara Cliff and Plateau (Rouch, 1953).

13–15th c. AD, Mali Empire

According to oral tradition, it was founded by Sunjata Keita (1230–1255), after the battle of Kirina against the blacksmith's Sosso king Soumaoro Kante, resistant to Islam (Ly-Tall, 1977). The empire attained its greatest power in the 14th century under the reign of Mansa Moussa I (1307–1332), and covered a zone from the Atlantic Ocean to Agadez in Niger, but it never seems to have included the Dogon Country. Many populations in West Africa today, among them the Dogon, relate to "Mande," the heart of Mali Empire, in the southwest of the current Mali and Guinea. They reveal important migrations from the southwest.

13–19th c. AD, Mossi kingdoms

These kingdoms expanded from the Niger River to the White Volta Basin. Mossi warriors exercised pressure on the Dogon of the Plain in the 15th century and controlled the territory up to today's border of Mali and Burkina Faso, causing the retreat of the Dogon to the Cliff (Izard, 1985).

17–19th c. AD

This period sees multiple influences, that is the influence of the Timbuktu Moroccans, generating regional insecurity, that of the Bamana kingdom of Ségou, seeking slave-warriors, that of the Fulbe Diina of Maasina, marked by the generalized conversion to Islam, and finally that of the Toucouleur hegemony, taken over by French colonial power. The Fulbe probably arrived in the Inland Niger Delta in the 13th century (Fay, 1997), but significantly influenced the Dogon Country probably only from the 17th century on.

Populations that did not form the basis for substantial political construction, but which were some of the first inhabitants of the region, are found in the proximity of the Dogon Country. These were integrated into the spheres of control of the successive empires in the Niger Bend. These are the Bozo, fishermen of the Inland Niger Delta, and the Bobo, mostly millet cultivators and hunters south of the Inland Niger Delta. Mythological tales say that they "came out of holes" (Daget, 1949; Fay, 1989, 1997; Gallais, 1980; Meillassoux, 1985; Monteil, 1971). Thus, to their original powers over water and land, other powers associated with populations arriving in waves were added over time. It is difficult to determine the age of these "indigenous" populations, whose languages both belong to the Mande family, sub-family Soninke-Dzuun (Ruhlen, 1987; Vydrine and Bergman, 2000–2003), but it is probable that their ancestors were already living in the region at the time of pre-Dogon settlements on the Bandiagara Plateau.

The ethnohistory of the Dogon

Our understanding of the history of Dogon settlement itself is based on the work of many researchers who have collected numerous oral traditions (Arnaud, 1923; Bouju, 1984; Delafosse, 1912; Desplagnes, 1907; Dieterlen, 1941, 1955, 1967; Gallais et al., 1975; Griaule, 1938; Izard, 1970, 1985). A review of these data led us, several years ago, to express certain critical remarks (Gallay et al., 1995). Studies published since then (Bouju, 1995; Holder, 2001; Kervran and Tembely, 1999; Martinelli, 1995) have stressed our considerations: Bouju (1995) criticizes with good reason the concept of "Dogon ethnicity" and Holder (2001), in a study of the Muslim urban group of the *Saman*, established among the Dogon on the Plateau since the 15th century AD, brings a new perspective to the multiple facets of settle-

ment of the “Dogon Country”. The main conclusions of our review are as follows:

- Early populations occupying the Bandiagara Plateau before the arrival of the Dogon were certainly more diverse than the concept of *Tellem* alone would lead us to suppose. We have thus chosen to speak here of pre-Dogon populations.
- The exogenous origin of at least a part of the populations called Dogon must be admitted. The origin which is claimed to be in the “Mande,” in the heart of the Mali Empire, is part of a vast coherent ideological system. Its interpretation in terms of migrations remains, however, to be verified. Moreover, origins other than those associated with the Mande should be at the same time taken into account for certain groups.
- The arrival date of the first Dogon groups in the Cliff region should be earlier than 1430 AD, the estimated age of the earliest large mask of the Sigui conserved at Ibi (Griaule, 1938),³ and earlier than the reign of the Mossi prince of Yatenga Naba Rawa (1470–1500 AD), to whom traditions attribute the first driving back of the Dogon toward the Cliff zone (Izard, 1985). The Mande tradition remains uncertain as to the date of the first migration, which took place either under Sunjata Keita (1230–1255 AD) or under Mansa Moussa (1307–1332 AD). Historically, the first Dogon settlement of the Cliff zone can be placed within a range of two centuries, between 1230 and 1430 AD.
- Oral traditions mention the possibility of a chronological overlap between Dogon and earlier settlements when numerous interactions would have taken place, leading to mixing of genes, technologies, and beliefs. Yet oral traditions do not allow evaluation of the importance of migration, from demographic or cultural viewpoints. It is thus not possible, on this basis alone, to tell if the current Dogon culture derives from a local substratum prior to immigration or if it is primarily the product of an external contribution.
- Along oral traditions, the arrival of the Dogon in the Cliff zone generated a migration of most of the autochthonous populations called *Tellem* towards Burkina Faso, where they would have mixed with local populations, notably Kurumba.
- Dispersal of the Dogon in the Plain, the Cliff, and the Plateau, after arriving in Kani-na at the base of the Cliff (Fig. 1), has been described by Dieterlen (1941).

³ We note, however, that M. Griaule puts forward the hypothesis of the possible presence of three additional masks, missing, which would place the date of the first mask at 1250 AD, the Sigui being celebrated every 60 years.

This migration concerns the three “tribes” whose common ancestor is the Lébé: the Dyon, Ono, and Arou. However, an absolute chronological framework cannot be established on the basis of this information. Moreover, these traditions concern the central part of the Dogon Country, and the history of the western and eastern regions is still poorly known.

- There is a wide variation between the numerous Dogon speech varieties, probably attributable to the complexity of the settlement history, neighboring influences, and minimal contacts between groups during certain periods. The taxonomy of Dogon language is disputed until now, being considered as part of the Voltaic family, Mande family or as an isolated language in the Niger-Congo group (Bertho, 1953; Calame-Griaule, 1952, 1956; Plungian and Tembine, 1994; Ruhlen, 1987; Hochstetler et al., 2004). Historical linguistics will be soon re-examined with new field data for the different speech groups (work in progress by R. Blench and D. Douyon).

Social memory of paleoenvironmental variation

Oral tradition informs not only about settlement history through genealogical information and migratory routes, but also on environmental variations. It is essential in this domain to study the association between real climatic change and their perception by the populations who had to adjust to these changes. For Hassan (2000, p. 121), “Archaeologists have often invoked climatic change as a causal factor in cultural transformation; however, the mechanisms by which climatic change influences culture remain obscure. I contend here that a consideration of how people perceive environmental change is essential for interpreting possible cultural responses. Environment perception is a function of the past experience that is available to an adult. Such experience is framed by inherited worldviews and values and by cultural strategies of cognition and action. [...] Actions become a part of the social memory if they are accepted by a sizable segment of the population and are passed on to future generations.”

In the Dogon Country, fertility cults and myths recurrently evidence the fragile equilibrium between man and environment, and constitute the symbolic world in which the response of cultivators to an unstable climate, detrimental to the reproduction of the group, is expressed.⁴

⁴ At Ounjougou, the confluence of the rivers is considered as the home of the water spirits (Nommo). The archaeological research was only possible after long negotiations with the earth priest and annual purification, by sacrifice of a black goat, for the possible transgressions caused involuntarily by the team members.

Apart from mythological conceptions and acts of a magico-religious order, tales relating the foundation and abandonment of villages also provide a framework for the perception of climatic conditions and the social responses devised in the past during periods of ecological stress. On the Plateau in the villages near Ounjougou (Fig. 2), we recorded several tales, all invoking the same themes, and it was often possible to find an historical basis to these tales, by discovering material remains.

In the village of Gologou-da, the tale of the establishment of the clan Kelepili explicitly mentions a forest environment and the necessity of setting up a sign to indicate access to the village in dense vegetation. The villagers showed this sign in the bush 3.5 km south of the village (Fig. 2). It is a large inclined slab (9 × 7 m) covered with engravings representing weapons (Huysecom et al., 2002). In Sinnkarma, the name of the village means “that which is damp” and recalls the discovery of the water source by the dog of a Dogon hunter called Wologuem, previously living with his relations at Sagoulou. In Sokolo, the Dogon Karambé told that they had abandoned their former village of Yabouso, where the water had dried up and moved to Sokolo, guided by the ash that had dripped from a bag attached to the back of the dog who discovered a pond. In the current village of Gologou-joï, the inhabitants called Nantume told that their ancestors lived in the high village of *Dangan-douloun* and obtained water from the Boumbangou, a tributary of the Yamé. They abandoned the site at the end of the 19th century, following the drying up of the river. Finally in Kaï, people said that the Dogon of Gandakilemo invited their ancestors to come and live with them, because they had a “magical” technique for keeping the water. In most cases, we were able to locate and visit with informants the abandoned villages mentioned in the tales.

Similar oral traditions were collected on the Plateau concerning the Karambe of Sibi–Sibi (Bouju, 1984) and on the Seno plain relating the abandonment of Dou-na-pey, one of the first villages established by the Dogon (Fig. 1; Dieterlen, 1941; Martinelli, 1995). The latter reunites the same fundamental recurrent elements and offers the Dogon the memory of a major climatic crisis and its consequences, the destruction of a centralized power, territorial changes, and migrations. In this way, these myths and tales can be seen as metaphors of ecological changes.⁵

This would not be complete without an example a recent real environmental change, confirmable in the field, already integrated in the local “social memory.” A tale, reported in several villages near Ounjougou, recounts a

quarrel between the water spirit of the Kammagolo (river Yamé) preventing other water spirits from passing. The more powerful one decided to take a different direction, opening up a new bed into which the two rivers rushed, causing the collapse of enormous chunks of land. According to the tale, some villagers died, while others discovered the weapons of the spirits in the form of stone axe blades, iron arrow and spearheads on the banks and in the water, showing them evidence of the spirit’s fight. A confrontation between the different tales leads to situate this event during a night of August, probably in 1936. This was a strong rainy season, but after the collapse, two or three years were dry and the villagers were obliged to do special sacrifices to the water spirits.

A careful observation of the area of the confluence showed that the river Yamé had a previous bed about 1.5 km long, different from the present one (Fig. 2). Geomorphologic analysis showed that such hydrographic modifications could have also taken place several times during the Holocene. This mechanism is likely to explain the different locations of sedimentary deposits according to different chronological periods in the confluence zone (Huysecom et al., 2002; Rasse et al., in press). A planimetric sketch for the map of Bandiagara (scale 1:200,000), made by the French National Geographic Institute (IGN) and completed in the field in 1952, shows the current course of the river, while a first map published in 1936 (but drawn a little earlier) still shows an earlier course. This demonstrates the reality of this uncommon and brutal phenomenon somewhere between these two dates, at the earliest in 1936. According to records in Bandiagara (pers. comm. Le Drezen) the rainfall in August 1936 was particularly important, with 398 mm, the double than the 1919–2003 average (191 mm). The rainfall in August 1937 and 1938 was less than this average, 187 and 117 mm, respectively. This climatic situation is well correlated with oral traditions. Thus, by exploiting all sources (local knowledge, cartography, and pluviometric data), it is possible to situate the phenomenon in August 1936. The archaeological remains we discovered during excavations of the remaining sediments in the confluence area, at the site of the *Promontoire* (see New archaeological works on the Bandiagara Plateau), suggest that the “weapons” that the villagers saw after the “spirit’s battle” were most probably Neolithic and Iron Age objects that had collapsed with the sediments.

Once again, the tradition transmits to future generations information of an important local environmental change, translated into a symbolic system for understanding of natural phenomena.

In brief, the arrival of the first Dogon groups to wooded environments well stocked with game, near important water sources, took place, according to historic traditions, between 1230 and 1430 AD. Villages were thus founded after the long optimal wet period

⁵ Following the example of the famous myth of the decline of the Ghana Empire after the disappearance of the rains, caused by the murder of the snake Bida, guarantor of fertility.

and after the first droughts documented for the 11th and 12th centuries AD, notably in the context of the fall of the Ghana Empire. Local knowledge indicate that at this time, the climate was probably still a little better than today, but more particularly that the environment was much less deteriorated by human activities. The many stories of village relocations and ecological crises (drying up of wells and rivers, famines as their consequence) that punctuate the history of the Dogon Country—both on the Plateau and the Plain—are entirely compatible with the increase in aridity and climatic instability, documented for the centuries following their arrival.

This study demonstrates that climatic variations and their consequences strongly influenced beliefs in the region, either at the level of stereotypes rendering an account of colonizations and abandonment of the territories, or at the level of mythological and religious beliefs. Moreover, comparison between local knowledge and data concerning the climatic alterations of the region shows that climate is a parameter that played an important role in the Dogon settlement history.

New archaeological works on the Bandiagara Plateau

Before the current project, the archaeology of the Dogon Country was known from research undertaken from 1964 to 1974 in the caves of the central Cliff of Bandiagara, near Sanga (Bedaux, 1972, 1974, 1980, 1991; Bedaux and Lange, 1983) and in sites further to the east in Nokara, Sarnyé and Douentza (Bedaux, 1972; Gallay, 1981; MacDonald, 1994, 1996, 1997–1998). These researchers identified three distinct occupations, called *Toloy* (3rd–2nd century BC), *Tellem* (11–16th century AD), and *Dogon* (16–20th century AD), based on evolution of architecture, material culture, and biological anthropology.

This chronology is not definitive, because dates are rare, uncalibrated, and their context is not always optimal. In addition, the transition between the Dogon and Tellem occupations in the 16th century is mainly based on anthropological analyses undertaken in the 1960s on supposed Tellem skeletons in comparison to modern Dogon and Kurumba populations (Huizinga, 1968). Early publications place the Tellem–Dogon transition to the 15th century (Huizinga et al., 1979), but more recent ones to the 16th century. Bedaux (2003, p. 39) writes: “all evidence leads to the belief that the Dogon influenced the material culture of the last Tellem. If we had not found skeletons or had found only poorly preserved skeletons, it is likely that the last Tellem phase would have been attributed to the Dogon.”

We consider that viable conclusions in terms of ethnic identities cannot be reached from the anthropological sample and statistical methods used at the time. Moreover, the specific function of these caves (storage, collec-

tive burials or funerary rituals), their specific geographic location and the absence of living sites suggested that research on the Plateau, where no archaeological research had been done before, would complement or revise the image of the past of the Dogon Country. It seemed particularly interesting to know if the hiatus of more than a thousand years preceding the Tellem occupation in the Cliff zone existed for the Plateau as well, and if occupations other than the Tellem were present before the arrival of the Dogon. We thus decided to excavate different archaeological sites in the area of Ounjougou, located 15 km east of the town of Bandiagara and survey the ruined villages nearby. We also investigated oral traditions in villages in order to reconstruct the migration routes of the various Dogon clans present on the Plateau, identifying the causes of villages abandonment and clarifying the relationships between the first established and the last settlers (Fig. 2; Huysecom et al., 1998, 1999, 2000, 2001; Mayor, 2003a; Mayor and Huysecom, 1999). Our data are obtained from (Fig. 2):

- Excavations in the loam accumulations on the protohistoric terrace of the Yamé, on the right bank, at the confluence of four watercourses, at a site called the *Promontoire*;
- Excavation of a rock shelter upstream on the right bank, 500 m far from the river, called *Dangandouloun*;
- Surface collection from 10 elevated villages in ruins, both upstream and downstream from the confluence, at a distance from 0.5 to 8 km from the river;
- Study of rock engravings, on the left bank, in the territory of the village of Gologou-da.

Material exposed by erosion at Ounjougou indicate the presence of other protohistoric sites and oral traditions mention other abandoned villages in the area, whose analyses will complete this study in the future. Concerning the rock engravings, nearly 400 motifs have been recorded and the stories of several elderly men who still have the memory of the meanings of these representations associated with the arrival of the ancestors of the Kelepili clan in the region have been recorded. This study will be developed in the future (Huysecom et al., 2002; work in progress by L. Cappa).

The Promontoire, an open air site on the Yamé river

Without the rapid and recent fluvial cutting of the Yamé near Ounjougou (see Ethnohistory, social memory, and settlement dynamics), all of the archaeological and geomorphologic richness of the site would have remained unknown. The protohistoric deposits found along the Yamé terrace, clearly visible on both sides of the confluence, which overlooks the river for a distance of 8–10 meters.

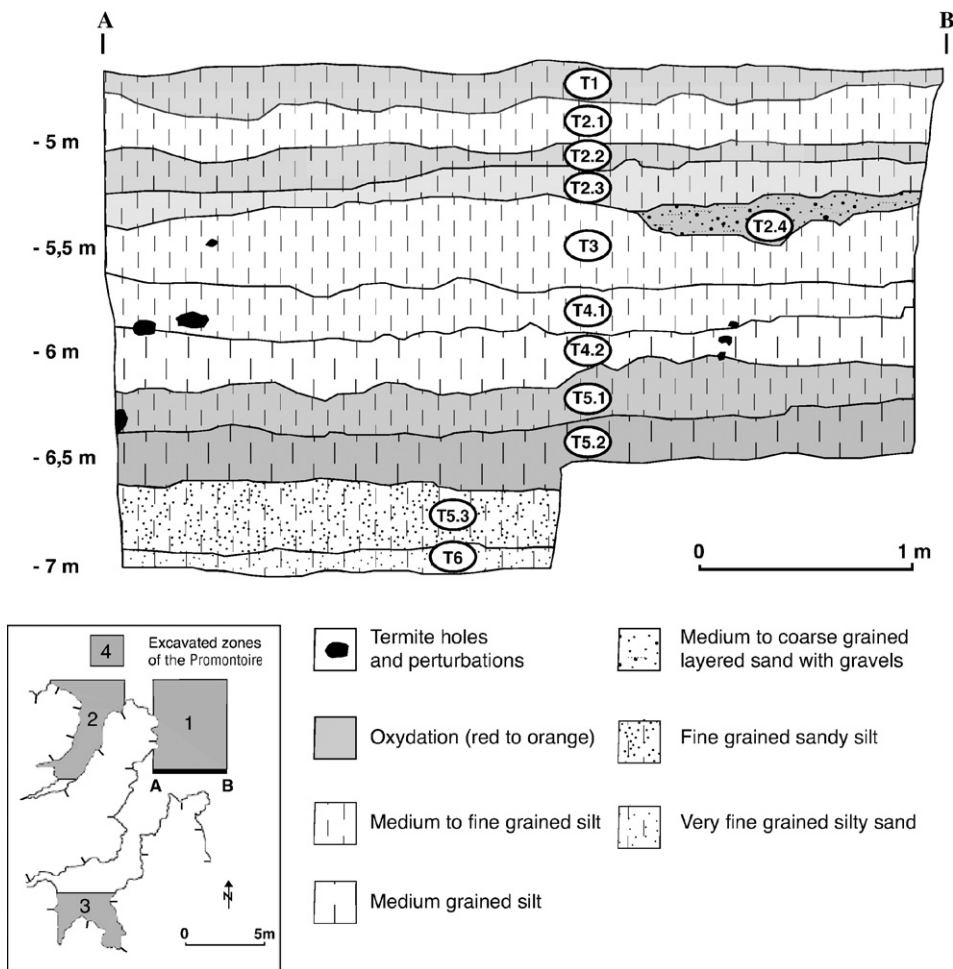


Fig. 3. Place of the excavated test pits and one of the stratigraphic sequences at the *Promontoire*.

The first surveys and stratigraphic works done in 1998–1999 yielded more than 200 pottery fragments from the surface and in the sections. Given the significant gully erosion cutting the sedimentary levels during the rainy season, we undertook excavations of four sectors in the best-preserved zones in February 2000, over a surface of more than 40 m² (Fig. 3). The objective was to approach the site from a planimetric aspect, to identify possible habitat structures and to better understand the succession of the terrace levels. These excavations yielded more than 300 pottery fragments (Huysecom et al., 2000, 2001; study in progress by A. Downing).

The protohistoric remains of the *Promontoire* are found in the stratigraphy of this terrace, characterized by several levels of colluvion, yellow ochre at the base, increasingly red towards the top (Fig. 3). Seven levels, for which the indurated summits correspond to occupation levels, have been distinguished, while some can be

further subdivided into distinct horizons. The lower levels are sterile: level 7, sandier than the others, is older than the protohistoric occupation. The intermediate levels 6 and 5, at a depth of more than 2.50 m, are also sterile and undatable. The main part of the archaeological material is concentrated in levels 4.2., 4.1, and 3. Five radiocarbon dates⁶ situate these levels between the 7th and the 12th–13th centuries AD (Table 1). The date from level 2 indicates a modern occupation (post 1650), in relation to agricultural activity of the neighboring villages.

The sequence is well correlated with known broad climatic variations. In general, starting with the first millennium BC, the tendency for sedimentary accumulation is the result of the decreased transport

⁶ For corrected dates, we have used a 1 σ calibration according to the curve of Stuiver et al. (1998).

Table 1
Radiocarbon dates from the Promontoire

Levels	BP date	Cal BC/AD (1 sigma)	Lab. Nr
Level 2	75 ± 35 BP	post 1650 AD	(Ly-10145)
Level 3	885 ± 50 BP	1040–1220 AD*	(Ly-10150)
Level 4.1	1005 ± 30 BP	990–1040 AD*	(Ly-9340)
Level 4.2	1315 ± 45 BP	660–720 AD*	(Ly-1284 OXA)
Level 7	2435 ± 45 BP	760–400 BC*	(Ly-1285 OXA)

capacity of the Yamé over the long term, a phenomenon that can be put in relation with progressive aridity. The removal of the finest-grained material on the nearby relief explains the dominant loam deposits: this accumulation at the base of the valley is thus due to the erosion of primarily Aeolian material deposited during the Upper Pleistocene and the beginning of the Holocene (Huyssecom et al., 2002; Rasse et al., in press).

More precisely, the relatively sandy deposit of lower level 7 corresponds chronologically to an unstable, rather dry climatic period. On the other hand, the thick colluvial layers in which protohistoric occupations of levels 3, 4.1, and 4.2 were found correspond to the optimum humid period. Finally, the abandonment of the site after the occupation dated to 1040–1220 AD* coincides with the drought of the 11–12th c. AD documented by Reichelt et al. (1992) and Maley (1981). The protohistoric terrace was subject to vertical incision by erosion only after the course of the Yamé changed in 1936.

The 236 analyzed potsherds indicate rounded forms, very rarely carinated or angular (Huyssecom et al., 2000). Several specific ceramics have also been recovered, such as massive perforated items, interpreted as weights, an item with a gripping system and five perforations, interpreted as the lid of an incense-burner, and an intentionally perforated vessel base. All the pottery is tempered with grog and most contains a large quantity of quartz. Decorations are quite homogeneous, with many types present in the three levels analyzed (3, 4.1, and 4.2). More than 90% of the potsherds show roulette impressions; the remaining are undecorated. The most frequent impressions are made with knotted strip, twisted cord, simple braided twine, accordion-plaited, and counter wrapped cord roulette (Fig. 10). The different roulette decorations identified on the Plateau are presented in Fig. 4.

Dangandouloun, a ritual rock shelter

The rock shelter of *Dangandouloun*, at about 500 m off the river Yamé, was excavated during the 1997–1998 and 1998–1999 campaigns over a surface of around 10 m², through four arbitrary levels (Mayor, 2003a; Mayor and Huyssecom, 1999). It yielded sedimentary

deposits ranging from 10 cm thick inside the shelter to 45 cm in front of the porch.

Above the sandstone substrate, the stratigraphy shows remnant lenses of a compact layer with large gravels (Fig. 5). This layer, without any artifacts, was dated to 4005 ± 40 BP (Ly-8849: 2580–2460 BC*) and probably indicates the remains of a Neolithic occupation destroyed by erosion.⁷

A layer of homogeneous beige silts, more or less interspersed with rocks is found on the top. Some large sandstone blocks are present in all levels. An assemblage of more than 84 different ceramics was found in this layer, the vessels sometimes almost intact in the lower part and more fragmented in the upper part. Most follow an alignment plumb with the porch, with the exception of some vases placed within the shelter. Nine potsherds were dated by thermoluminescence⁸ to 610 ± 50, 730 ± 50, 780 ± 50, 900 ± 100, 900 ± 100, 1000 ± 100, 1100 ± 100, 1180 ± 30, and 1180 ± 40 AD. These vessels thus seem to be contemporaneous with those of the *Promontoire* and prior to, or contemporaneous with those associated with early Tellem funerary caves. In addition, about 80 iron objects were discovered, mostly within the shelter. They include various types of arrow points, rings and a 32 cm long prong, sharpened on one side and beveled on the other.⁹

Again, this assemblage provides evidence for an occupation of the Plateau during the humid optimum period and its abandonment during the drought dated to the 11–12th century AD. Along with the site of the *Promontoire*, this rock shelter partially fills the hiatus observed in the caves of the Cliff between the Toloy (2–3rd c. BC) and the early Tellem occupation (11–12th c. AD).

Finally, several small charcoal fragments, scattered in the sediments among the potsherds and above them, have been dated to 340 ± 35 BP (Ly-9337), between 1490 and 1640 AD*, that is several centuries after the production and discard of the ceramics. This could be due to a sudden drainage from the Plateau during a season of intense rains, which would have infiltrated large fissures and, carrying small charcoals within the sediment, would have covered the archaeological remains, concealing them until now.

Regarding the pottery material (Fig. 6), six morphological groups can be identified: jars serving for the storage of liquids or food, small bowls, large and small lids, three-footed cups serving as ritual vessels, and small

⁷ Open air Neolithic settlements occupied during this period were found at Ounjougou about 1 km from the shelter.

⁸ Benchmark measurements in the field were made by the laboratory of Oxford, before producing dates.

⁹ This object could be interpreted as a portable anvil to revive the barbs of arrow points or a tool to carve the interior of wood masks.


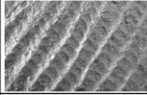
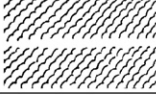

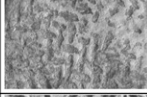
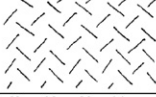

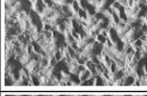
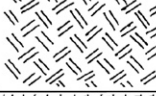

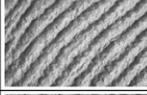
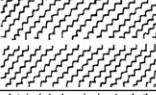

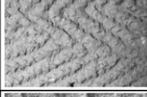
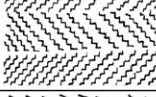

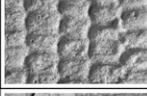
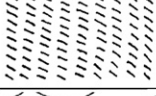

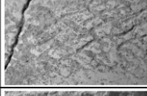
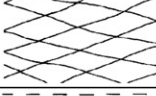

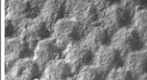
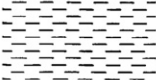
Roulette (Tool)	Impression	Semiology	English terminology (Soper 1985 / McIntosh 1995)	French terminology (Gallay et al. 1998)
			Twisted string roulette (TGR) Twisted twine / cord roulette (tw 6+7)	Cordelette simple
			Knotted string roulette (KGR) Braided / plaited twine roulette simple (tw 1+2+10)	Cordelette tressée simple
			Double knotted string roulette (double KGR) (tw 3)	Cordelette tressée double
			Knotted strip roulette (KPR)	Tresse simple
			Alternate knotted strip roulette Twisted looped /alternate roulette (tw 12)	Tresse alterne
			Accordion-plaited strip roulette, beaded pattern (tw 4+5)	Tresse-accordéon
			Counterwrapped cord roulette (tw 8+9+11)	Peigne fileté croisé
			Cuneiform stabbing?	Epi végétal (<i>Blepharis sp.</i>)

Fig. 4. Main roulette impressions observed on the ceramics of the Bandiagara Plateau in the present and the past, with tool and alternative terminologies.

plates, also serving for rituals (Mayor, 2003a). The decoration, quite varied, is mainly composed of strip roulette impressions (simple knotted, alternate knotted or accordion-plaited), twine roulette impressions (simple braided, double braided or twisted), carved roulette, plastic motifs and red paint (Fig. 10). Mat impressions are also present, but rare. The techniques used to shape the pottery are mainly the modeling and the hollowing of a lump of clay combined with coiling, except for the pottery with mat impressions, shaped by pounding on a concave mould. Analyses of technological, morphological, and decoration characteristics indicate a homogeneous deposit, comprising only a few potteries of different traditions.

Analysis of the spatial distribution of the various types of objects and the reconstruction of their primary position shows a contrasted situation, uniting on the one hand (in front of the entrance and within the shelter) iron objects, small plates and bowls, and on the other hand (corridor to the left of the entrance) the majority of jars and large lids (Fig. 7). The three-

footed cups are found across the entire excavated zone. This distribution suggests the use of the shelter for precise purposes, requiring functionally different zones. The configuration of the shelter (limited ground surface, low ceiling, and natural platform), the spatial distribution of the ceramics, the ritual function of tree-footed cups and small plates, and the good state of preservation of the material exclude functions such as dumping area and refuge dwelling site and favor the use of this place for the rituals' practice, probably in relation with the cult of ancestors. A similar shelter documented by Dieterlen (1941, p. 5) indicate that such places can be used during numerous generations by a single community, bringing a pottery after the death of villagers and practicing rituals for ancestors. This can explain why pots made several centuries apart can remain intact side by side for so long. The thermoluminescence dates of Dangandouloun indicate that this shelter was used over five centuries, by people living in the area before the arrival of the Dogon (Mayor, 2003a).

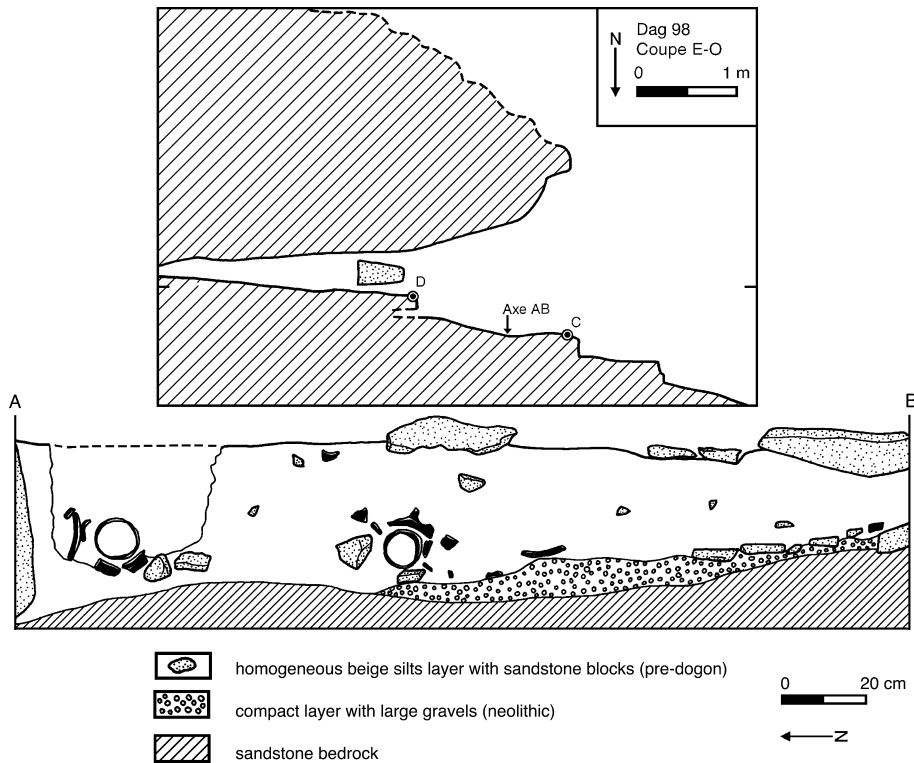


Fig. 5. Stratigraphy at *Dangandouloun* rock shelter.

Abandoned villages known from Dogon oral tradition

The question of Dogon occupation since the 15th century has been addressed by stepping back from the present to the past. To establish relationships between ceramic styles, chronology and ethnic identity during the period of Dogon occupation on the Plateau, we have chosen 10 abandoned villages, currently in ruins, for which the location, approximate time of occupation, and identity of the inhabitants is more or less known. Orosogou, Doumbono, Goodio, Yabouso, Saalou, Pangai, Koumoundiguli, Kai-na, Dangandouloun-village, and Bondo are the investigated sites (Fig. 2). Beside the ethnohistorical information, we have collected sherds samples from each site, ranging from 72 to 349 specimens.¹⁰

At Orosogou, we discovered a three-footed cup decorated with knotted strip roulette impressions identical to those discovered in the rock shelter of *Dangandouloun*. In addition to standard collection, we then proceeded to excavate a 50 × 50 cm test pit down the bedrock (about 40 cm deep). The trench yielded numer-

ous fragments of charcoal and faunal remains of a common guinea fowl (*Numida meleagris galeata*) and a rodent of the Muridae family, probably a rat (*Rattus rattus*),¹¹ in direct association with the tree-footed cup. A distal femur, most likely human, and two small iron fragments (a ring and a pendant) were found within the same quadrangular stone structure delimiting a house. The charcoal dated by accelerator mass spectrometer (AMS) gives a date of 315 ± 40 BP (ETH-24060), indicating an occupation of the village and a use of the cup between 1510–1650 AD*. The Tellem footed cups at the Cliff being dated to the 11th and 12th centuries AD and those at *Dangandouloun* between the 7th and the 12th centuries AD, this piece could have been an older cup collected by the inhabitants of Orosogou from an abandoned site. Dieterlen (1965) mentions the re-use of Tellem ritual statuettes by Dogon people. Photographs (Beckwith and Fisher, 1999, p. 78; Lauber, 1998, p. 164) illustrating a three-footed cup being used today in a cave at the Cliff in Koundou-Goumo support the idea of the re-use of ancient ritual objects.¹²

¹⁰ The sampling method was to collect as many potsherds as possible on the entire surface of the village, taking into account only the ones large enough to enable us to recognize the decoration type.

¹¹ Determination made by Patricia Chiquet, Museum of Natural History of Geneva.

¹² Clarifications on the context of this photograph would be desirable.

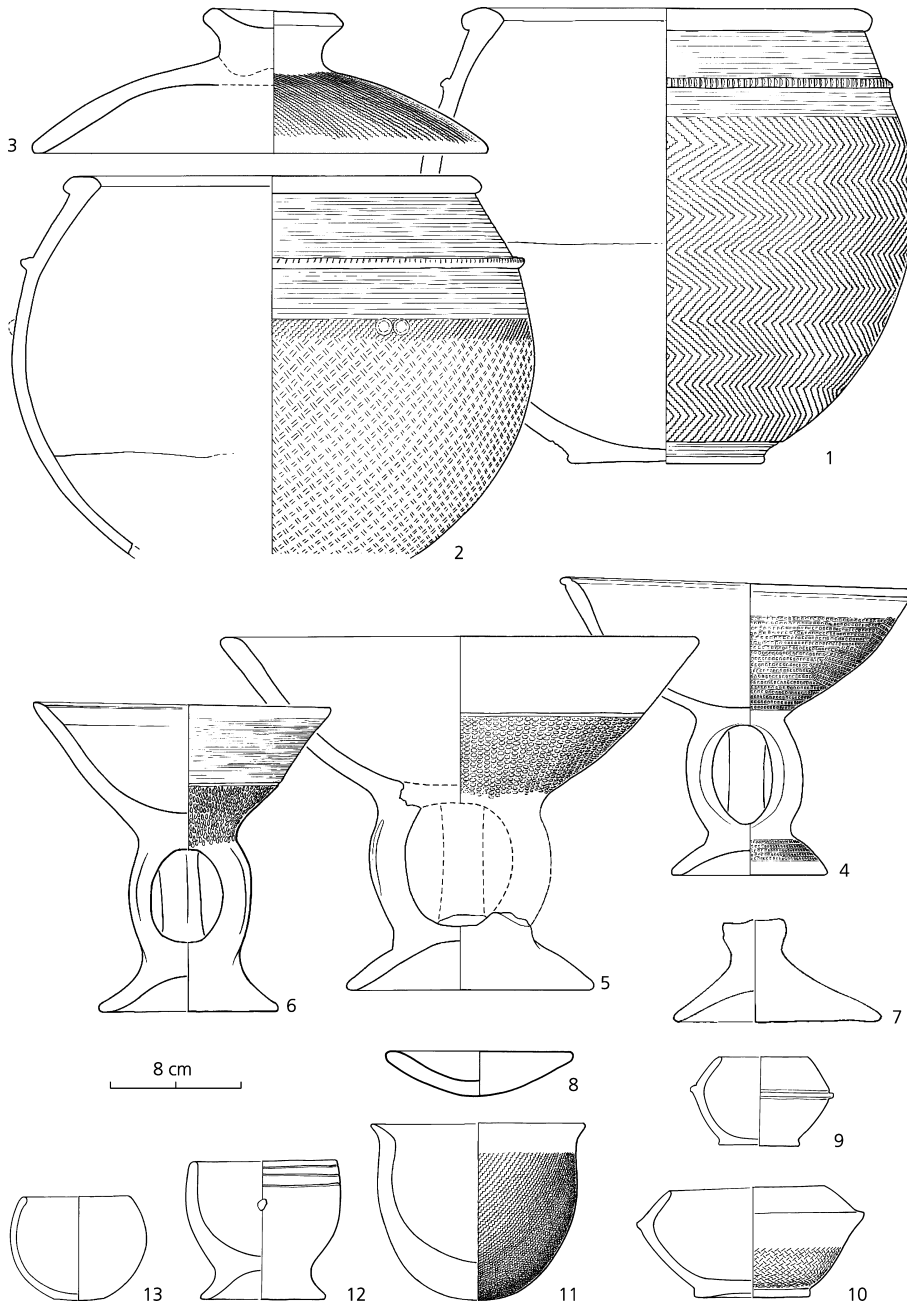


Fig. 6. Ceramics of the *Dangandouloun* rock shelter. 1–2, jars; 3, large lid; 4–6, three-footed cups; 7, small lid; 8, small discoid plates; and 9–13, bowls.

But Orosogou is the subject of a controversy over the identity of its inhabitants (Bobo or Dogon clans), as well as the sites of Doumbono and Goodio.

Moreover, informants in the village of Sokolo told us that their migration (that of the Karambe of the Koloun clan) went through three abandoned villages: a locality near Niongono, we named Pangäi (the name of the

respective bush),¹³ Saalou and Yabouso. It is rare to have such a chronological series of sites that can be used to examine the development of ceramic traditions used

¹³ There is a doubt concerning the location of this last site, the earliest and the most distant of the three.

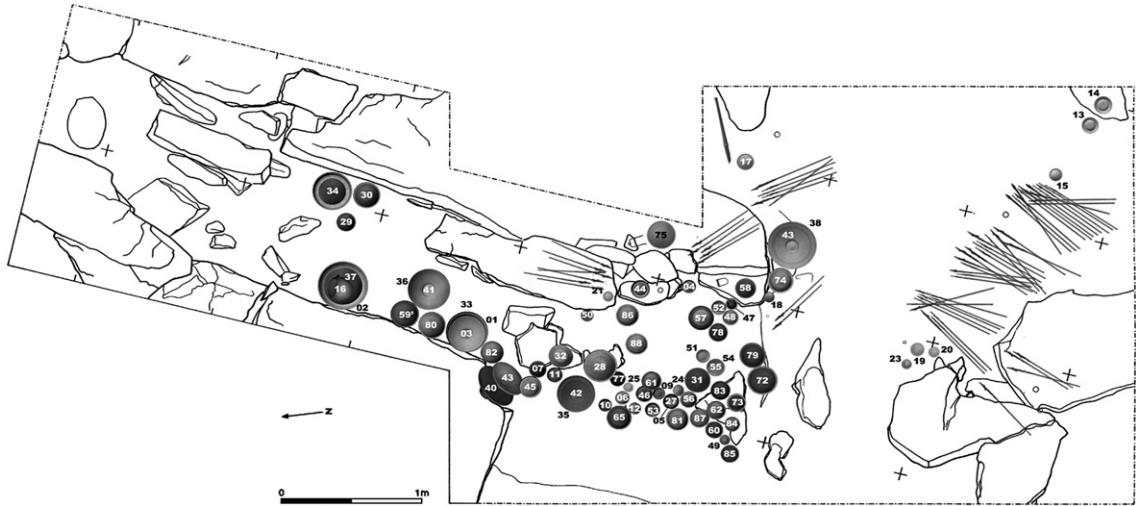


Fig. 7. Reconstitution of the primary place of ceramics and iron objects in *Dangandouloun* rock shelter.

by a single population, on several sites successively abandoned before the settlement of the current village, covering a chronology of several centuries.

Finally, the site of Koumoun-diguili is the old village of the holders of sacred land (*yayye*) covering most of the territory of the site of Ounjougou, that is, the Napo Dogon of the Koloun clan. The site of Kai-na is associated with the arrival of the Kassogué Dogon of the Oolou clan in the region, also holders of a *yayye*. The sites of Dangandouloun-village (situated above the rock shelter) and Bondo are associated with the occupation of the Kelepili and Wolomo Bannou Dogon of the Arou clan.

With the aim of identifying relationships between styles, chronology, and ethnic identity, we have begun with a preliminary sorting of the pottery collected at the abandoned villages mentioned, according to decoration. After having excluded the site of Pangai whose location is doubtful from the provisional analysis, we propose the division of the living sites in three groups, characterized as follows:

- the first group of sites (Bondo, Dangandouloun-village, Kai-na, and Yabouso), group 1, includes pottery showing a high percentage of baobab fiber mat impressions often associated with vertically incised appliqué ribs decoration, and of twisted cord roulette impressions, but with rare braided twine roulette (simple or double) impressions, and without strip roulette (simple knotted or alternate knotted) impressions;
- another group of sites (Saalou, Doumbono, and Goodio), group 3, attests for the opposite: an absence of baobab fiber mat impressions and/or vertically incised appliqué ribs decoration, an absence or low percentage of twisted cord roulette impressions, but the presence in varying percentage (less than 10% to

more than 20%) of braided twine roulette (simple or double) impressions and knotted strip roulette (simple or alternate) impressions;

- the final group of sites (Koumoun-diguili and Orosogou), group 2, shows a distribution of decorations intermediate between the above two groups: like group 1, it includes an important percentage of potters with baobab fiber mat impressions and/or vertically incised appliqué rib decoration, twisted cord roulette impressions (although in much lower percentage), and the absence of decorations with alternate knotted strip roulette; in contrast, like group 3, it includes a variable percentage (10–20%) of braided twine roulette and knotted strip roulette impressions.

The division of the villages into three groups does not appear to have a geographic meaning, since the sites of Kai-na, Orosogou, Doumbono, and Goodio are found in the three groups, even though they are very close to one another (1–3 km). These groups also do not have a simple “ethnic” meaning, since the sites of Yabouso, Saalou, and Koumoun-diguili, although they indicate a range of radically different decorations, are said to have all been occupied by the Dogon of the Koloun clan. The question is then to understand the meaning of these material differences by comparison with material of pre-Dogon sites and current Dogon ceramic traditions.

Making sense of the material record

The ethnoarchaeology of pottery production

An ethnoarchaeological approach is important for understanding the meaning of ancient ceramics, by far the most abundant material on archaeological sites.

The issue of the recognition of cultural identities and social boundaries in material remains has been explored in numerous recent conferences and publications (for example Jones, 1997; Shennan, 1989; Stark, 1998; symposium “theorizing culture in ethnoarchaeology,” SAA meeting, Montreal, 2004). The study of ethnicity is a controversial topic in contemporary archaeology, and it has been argued that the identification of archaeological “cultures” and their association with past ethnic groups is inadequate, because of the permeable and fluid nature of ethnic identity (Jones, 1997). Furthermore, the epistemological limits of interpretation in archeology were brought to the fore several decades ago, principally due to the incomplete nature of the archaeological record and the poor understanding of the material expression of ethnological concepts. The result is that archaeologists have often renounced this type of approach or are reticent when confronted with the question of “cultural,” “social” or “ethnic” identities in the past. One is satisfied with defining “archaeological cultures” in space and time as groups of material characteristics that lack any other significance.

But we think it is important to deal with these questions, rather than simply continuing to raise them. It is clear that in order to address the question of cultural identities, it is necessary to develop an adequate conceptual framework constructed on the present that takes into account the complexity and dynamics of societies. It was this aim that motivated the launching in 1988 of a vast project of ethnoarchaeological research in Mali. The objective was to understand the relationship between material data and their socio-cultural meaning in the present; the method consisted in describing the material variability, observing regularities and finding the underlying mechanisms explaining them (Gallay, 2002; Gallay et al., 1996, 1998; Mayor, 2003b). This work has demonstrated the multiplicity and complexity of the ceramic traditions of this region. An application to 19th century AD archaeological sites of Hamdallahi and Modjodjé was also made, which attests to the potential of this approach (Gallay et al., 1990; Mayor, 1996, 1997).

Concerning the Dogon Country, two short studies in the Sarnyéré (Gallay, 1981) and at Tirelli (Bedaux, 1986) yielded the first available data. Subsequently, ethnoarchaeological studies of the MAESAO team (Mission ethnographique Suisse en Afrique de l’Ouest) have completed the data and showed the diversity of the current traditions (Gallay et al., 1998). It was thus necessary to conduct a systematic ethnoarchaeological study for the entire Dogon Country in order to refine the characterization and location of ceramic traditions linked with either the agricultural groups or the associated blacksmith clans, to work out the mechanisms explaining their spatial patterns.

In the Dogon Country, a fundamental difference can be observed today between ceramic traditions proper to

farming women and those proper to the blacksmith’s wives of various clans. Five main traditions with different “chaînes opératoires” (Figs. 8 and 9) have been distinguished (Bedaux, 1986; Gallay, 2003; Gallay et al., 1998; Huysecom and Mayor, 1993). Ceramic traditions are here considered as a group of technological, morphological, and decorative characteristics, specific to the production of pottery of a particular social group, whether this is an endogamous artisan class or a matrimonial network within a group of farmers:

- Tradition A: practiced by farming women, does not constitute production of an endogamous caste. The preform is made by pounding the clay with a stone hammer, on a mat of baobab fibers placed on a hollow surface (on the ground or on a grindstone). Simple spherical forms show a thickened edge, sometimes painted red, and a body covered with negative prints of the mat used during pounding process. The area covered by this tradition is centered on the Plateau and the Cliff, and is found on the plain following migrations from the Cliff;
- Tradition B: it is practiced by the *Djèmè-na*¹⁴ blacksmith’s wives. Shaping is done by the pounding technique with a clay tamper, on a massive concave mould of unfired clay or over a depression in the ground. Forms are typically spherical and decorations are limited to appliqué ribs, impressed or not. The important extent of this tradition includes most of the Seno plain and northern Burkina Faso. This tradition is close to that of the Mossi blacksmith women;
- Tradition C: it is associated with the Tomo and Dafi blacksmith’s wives. Three techniques are used, the hollowing or shaping of a lump of clay, superimposition and drawing of large rings (that is cylinders and not coils), and molding on a convex form; the last of which is not found on the Plain, with the exception of villages at the base of the Cliff. The support consists of a mobile plate made from a potsherd. Despite the technological heterogeneity, the vessels are stylistically similar, with the base covered with traces of knife scraping, corn cob smoothing or twisted cord roulette impressions, depending on the method used. Decoration at the top of the body is characterized by impressions of vegetal cob roulette (*Blepharis sp.*), and orthogonal or chevrons motifs incised or painted red and white. The area of distribution covers the southern part of the Plateau and the southwest of the Seno plain for the Tomo potter women, and the south of the Plain for the Dafi;

¹⁴ The *djèmè-na* or “first blacksmiths” are assumed to be the descendants of mythical blacksmiths who came down from the sky along a chain (Griaule, 1938).

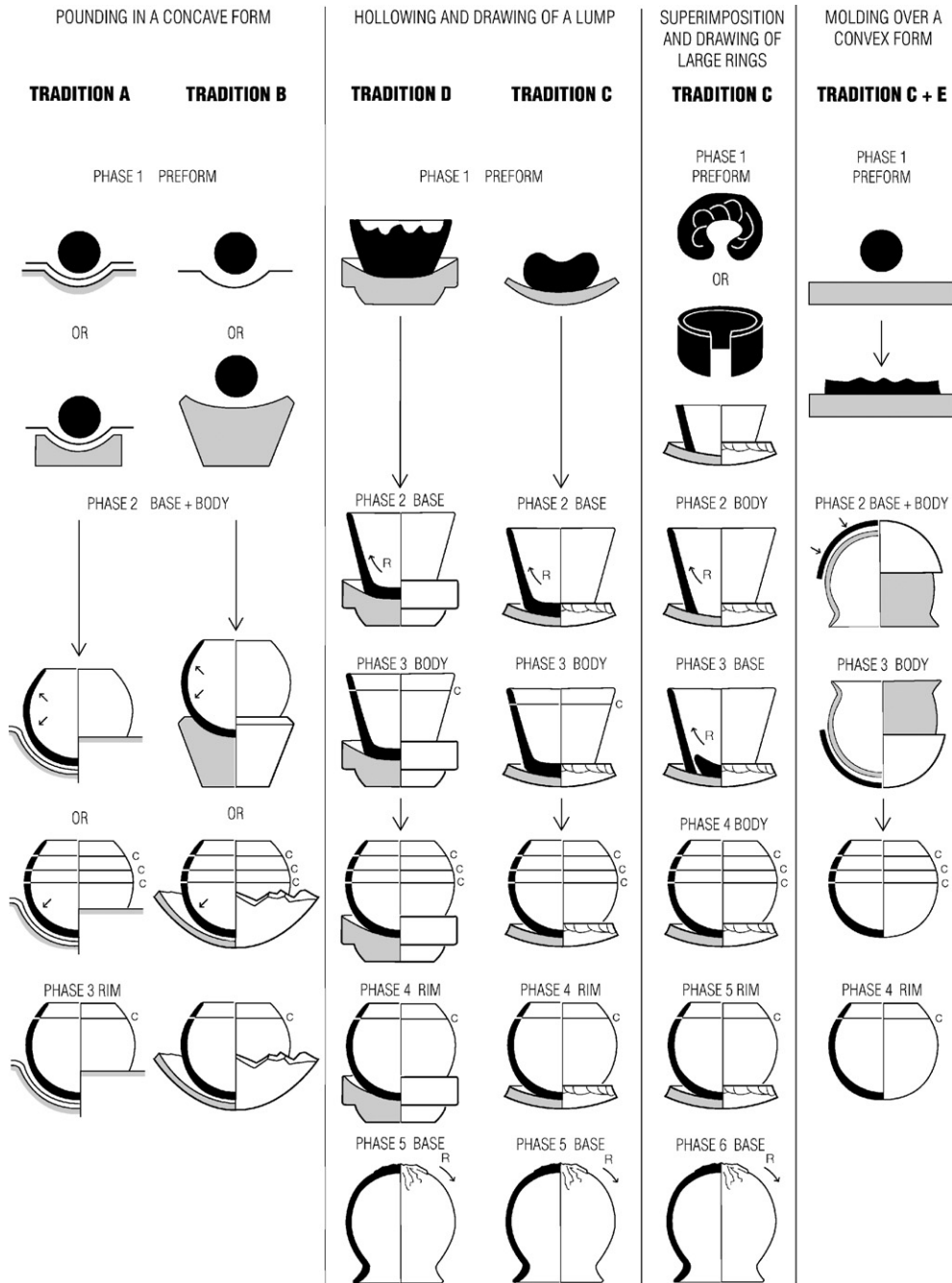


Fig. 8. Forming techniques characterizing current ceramic traditions in the Dogonland.

- Tradition D: this is practiced by the *Irin*¹⁵ black-smith's wives. The technique employed is that of the hollowing of a lump of clay on a mobile support

¹⁵ The *Irin* come from the *Djèmè-na* and are reputed to have perfected their technique during "voyages."

of raw clay, sometimes put on a stone slab. Diverse forms, with thick walls and traces of scraping, include large jars with a slightly pointed base (from the cup). The bodies are covered with twisted cord roulette impressions, bordered in the upper part by decorticated vegetal cob impressions (*Blepharis* sp.) or by

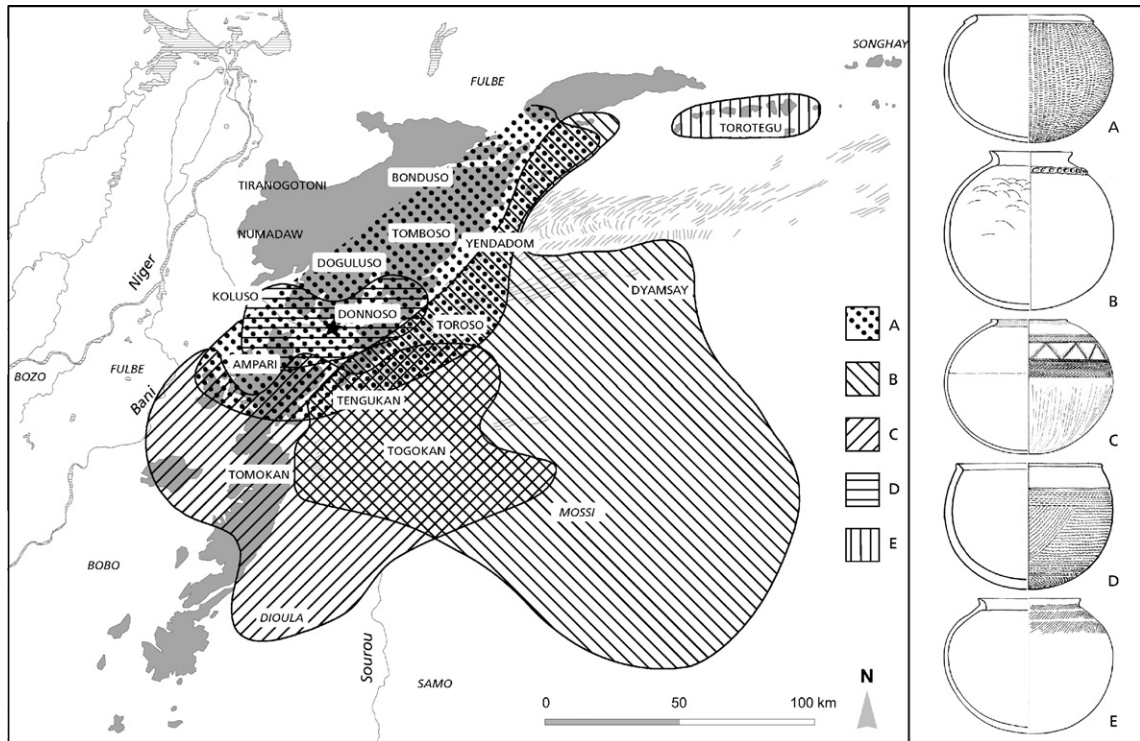


Fig. 9. Map of current ceramic traditions and dialects in the Dogon Country. (A) Dogon farming potter women tradition, (B) Djèmèna blacksmiths's wives tradition, (C) Tomo and Dafi blacksmith's wives tradition, (D) Irin blacksmith's wives tradition, and (E) Dogon and Rimai be farming men tradition.

incisions. Located to the west of the Plateau (Pignari and Kamma), this tradition is absent on the Plain. It presents some affinities with the tradition of the Bobo blacksmith's wives;

- Tradition E: this is the product of Dogon farmers and the Rimai (ancient captives of the Fulbe), men or women. The base of the vessel is molded on a convex form and the upper part is constructed with thick coils, standardized by beating with a palette, a clay tamper serving as anvil. Forms are simple and decoration limited to a band of twisted cord roulette impressions and large knobs at the top of the body (Gallay, 1981). This tradition is found in the Gourma-des-Monts and is no longer present in the Dogon villages of Hombori, which reject their origins and only use the ceramic methods of the Songhay blacksmiths' wives. It shows similarities to the Fulbe tradition.

Thus, at the level of production, different ceramic traditions exist, characterized by forming techniques and aesthetic properties reflecting the identity of the producers. The mechanism explaining this tight correlation between traditions and distinct social or ethnic entities is linked to the apprenticeship for learning pottery-shaping techniques. It is in most cases long and requires the

acquisition of motor skills which implies close and enduring ties of familial type between the teacher and the student (Arnold, 1985, 1989; Gallay and de Ceuninck, 1998; Gosselain, 2000, 2001). A dynamic history over several centuries, marked by several types of borrowing processes (Gelbert, 2001, 2003), explains the current combination of traditions and ethno-linguistic groups.

While ceramic assemblages are well distinguished at the level of production, the situation is less clear at the level of use, because on the market choices of buyers are not necessarily based on ethnic criteria. They are instead determined by personal preferences (price, quality of the product, functional range available). Despite this phenomenon of tradition blending, statistically compounds show a general tendency for "ethnic auto-consumption" of ceramics, that is using ceramics from ones own ethnic group (Gallay, 1992; Gallay and de Ceuninck, 1998). The habitation units include on average more than 75% of the ceramics of the inhabitants' ethnic group, with the exception of Fulbe and Songhay (only 50–60%), whose technique seems unable to fill the whole range of functional needs. This phenomenon of ethnic auto-consumption is, moreover, clearly more marked with highly decorated potteries, because they

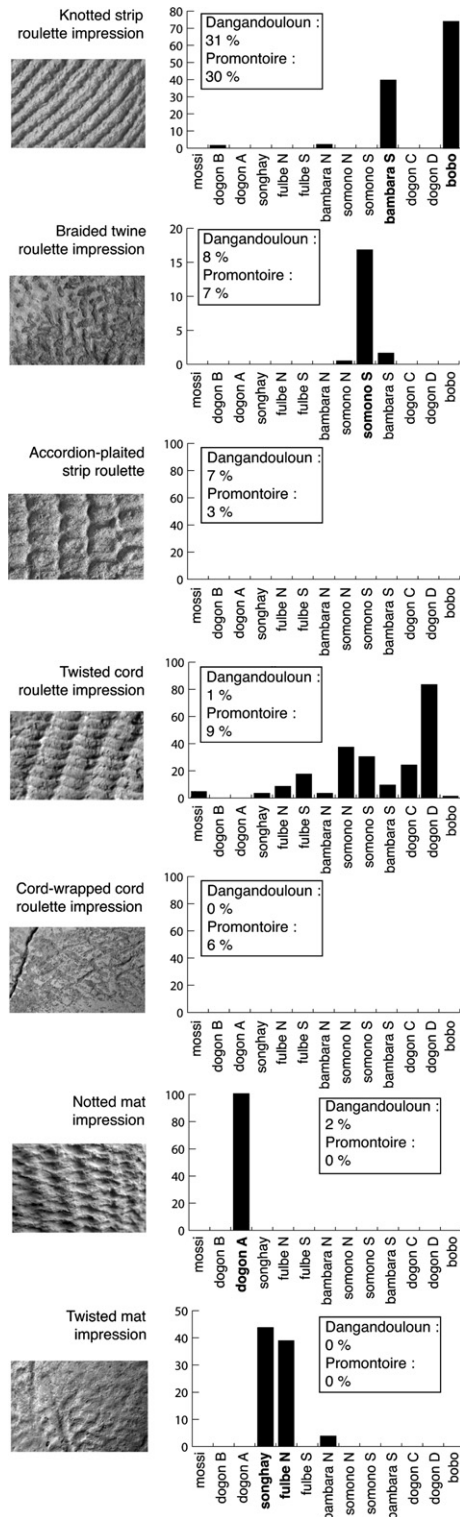


Fig. 10. Percentages of different decoration patterns in the current ceramic traditions ($N = 2730$), compared with those of pre-Dogon archaeological ceramics of the Bandiagara Plateau.

are often the result of matrimonial gifts given within a family context (de Ceuninck, 1993; Gally and de Ceuninck, 1998). In this case, the auto-consumption percentage rises to between 85 and 95%, including Fulbe and Songhay.

At the level of diffusion, the spatial distribution of a ceramic tradition reflects the settlement structure of the producing group (de Ceuninck, 2000). The spatial structure of a tradition is constructed under the cumulative effect of socio-economic mechanisms of production, diffusion and acquisition of ceramics. That is to say that a ceramic tradition retraces the contours of an endogamous group, within which trade exchanges are organized. This matrimonial group, doubled by a trade network, kicks a technological and stylistic homogenization of the ceramics that are produced and exchanged. These mechanisms explain the spatial organization of the traditions in three main concentric zones characterized by a decline in the number of the pots: a *central zone* (production zone with dominant ceramic tradition, significantly occupied by the ethnic group), a *peripheral zone* (consumption zone, with lower representation of the ceramic tradition, going beyond the limits of the ethnic group) and an *exterior zone* (occasional acquisitions zone with isolated items of the ceramic tradition, outside the respective settlement zone). Maps with contour lines of isofrequencies demonstrate clearly this structure (Burri, 2003).

The main limitations of this approach consist in taking into account the influence of factors that moderate the correspondences between ceramic traditions and ethnolinguistic groups: these are principally the processes of technological borrowing, processes of social recomposition resulting in new human groupings, as well as the relative interdependence of caste groups, including the potters, in relation to agricultural groups. But these phenomena do not counter our global approach.

Archaeological pottery and the ethnographic present

Comparisons between the ceramics of the Plateau at the sites of the *Promontoire* and *Dangandouloun* (7–13th c. AD), with contemporaneous or earlier regional archaeological assemblages are possible with different regions (Table 2, Fig. 1): The central Cliff (not far to the East), the Gourma (further to the East and North-east), the Inland Niger Delta (to the Southwest, west and northwest), and the Lake region (to the north). The excavated, well-dated and published sites are the following:

- Caves of the Cliff of Bandiagara (Bedaux and Lange, 1983; Bedaux and Raimbault, 1993): Toloy phase (sherds trapped in granary walls, two terminus post quem dates of 800 BC*–10 AD*) and early Tellem phase (ritual funerary ceramics, four dates on bone of 1030–1430 AD*);

Table 2

Comparison of main ceramic decorations present at the pre-Dogon sites on the Bandiagara Plateau with those of earlier and contemporaneous sites of the Gourma, the Cliff, the Inland Niger Delta and the Lake region (small disc, rare; big disc, present)

Roulette impressions	Earlier sites					Excavated sites		Contemporaneous sites				
	T.Maare Diabal, Oursi, Kissi	Toloy	TiebalaFII	Jenné-Jeno I/II	Mouyssam II	Dangan- douloun	Promontoire	T.Maare Diabal, Oursi, Kissi	Early Tellem	Jenné-jeno III/IV	T.Galia, T. Doupwil	Kawinza I
Knotted strip roulette		●			●	●	●		●		●	●
Alternate knotted strip roulette		●		●		●			●	●	●	
Accordion-plaited strip roulette		●	●	●	●	●	●			●	●	●
Twisted cord roulette	●	●	●	●		●	●	●	●	●	●	
Simple braided twine roulette				●	●	●	●			●	●	●
Double braided twine roulette				●		●				●	●	●
Knotted Baobab fibers Mat	●					●		●				
Counterwrapped cord roulette		●		●			●			●		

- Mound (tells) of the Gourma, at Tongo Maaré Diabal (Bedaux et al., 2003; MacDonald, 1997–1998): 400–1200 AD; at Oursi and Kissi (Magnavita, 2003; Magnavita et al., 2002): 50–1200 AD; and at Gao-Saney and abandoned areas of the Songhay capital, Gao-Ancien (Insoll, 1996, 2000): 7–13th centuries AD.
- Mounds (tells) of the Inland Niger Delta, at Jenné-jeno (McIntosh, 1995; McIntosh and McIntosh, 1980): phases I/II (250 BC–350 AD), phase III (350–850 AD), and phase IV (850–1400 AD), at Tiébala (430–780 AD*; Curdy, 1982), at Toguere Galia (980–1300 AD; Bedaux et al., 1978) and Toguere Doupwil (980–1630 AD; Bedaux et al., 1978).
- Mounds of the Lake region (Raimbault and Sanogo, 1991), at Mouyssam II (240–680 AD*), Kawinza I (670–1020 AD*).

We have considered, but not included in our table, the ceramics of Dia-shoma -horizon I (800–300 BC), horizon II (300 BC–300 AD), horizon III (300–800? AD), and horizon IV (800?–1100 AD)-, (Bedaux et al., 2001), of the Iron Age sites of Méma (Haaland, 1980; Togola, 1996), of Kumbi Saleh (Berthier, 1997) and Saouga (Vogelsang, 2000), because their study is not published in sufficient detail. We have taken into account information from Koukia (Arazi, 1999), Timbuktu (McIntosh and McIntosh, 1986), and Ségou areas (MacDonald, 1997), but only surveys have been made there and no radiocarbon date are available. Our comparisons are based primarily on decoration techniques, because information about forming techniques is not always available.

Comparison with earlier assemblages (Table 2) of the Inland Niger Delta (phases I/II of Jenné-jeno, hor. I/II of Dia, Tiébala), of the Lake region (Mouyssam II), of the Cliff (Toloy phase), and of the Gourma (Kissi, Oursi, and Tongo Maare Diabal) demonstrate that the two ceramic assemblages of the Plateau have inherited most of their decoration from the previous phases present in the area. The *simple braided twine roulette* impressions were present in the Inland Niger Delta, the Lake region and the Méma (but not in the Gourma and the Cliff). The earlier evidence of this décor was found in the Neolithic site of Kobadi in Méma during the 2nd mill. BC (Raimbault and Commelin, 2001–2002), and in the first horizon of Dia during the 1st mill. BC. The *accordion-plaited strip roulette* impressions were already present during the first centuries BC and AD in the Inland Niger Delta, the Lake region, the Méma and the Bandiagara Cliff (but not in the Gourma). Rare *knotted strip roulette* impressions were recorded in the Toloy assemblage of the Cliff, as well as at Mouyssam II in the Lake region (but not in the Gourma and the Inland Niger region). *Mat impressions* linked to the technique of pounding on a concave form were present in the Gourma and further to the East (early Iron age sites of Chad basin, see Sterner and David, 2003), but not in other close re-

gions. The so-called mat impressions identified on Neolithic ceramics of Kobadi, formed by molding on a convex shape, were rather probably obtained by wrapping a stone hammer with a textile or a fabric before pounding the clay above an upside down pottery (Raimbault and Commelin, 2001–2002). The *twisted cord roulette* impressions were present in the Inland Niger Delta, the Gourma and the Bandiagara Cliff (but not in the Lake region). We will not emphasize this decoration, which is not a very useful tool to indicate any specific influence because it is used nearly everywhere since the Neolithic times until today. All these decorations persisted then in variable proportions at different sites.

Comparison with contemporaneous assemblages (Table 2) of the Delta (Jenné-jeno III/IV, Toguere Galia and Toguere Doupwil), the Lake region (Kawinza I, Timbuktu), the Cliff (early Tellem), and the Gourma (Tongo Maare Diabal, Oursi, Kissi, Gao) shows again different decorative influences. *Accordion-plaited strip roulette* and *simple braided twine roulette* impressions, absent on the Cliff and in the Gourma, but present in the Lake region, the Méma, and the Inland Niger Delta (80% of braided twine in Jenné-jeno phase IV), evidence a clear influence from this area. It should be noted that the accordion-plaited strip roulette impressions are also the main decor (along with twisted cord roulette) present in Kumbi Saleh, the capital of the Ghana Empire occupied from the 9th to the 15th c. AD (Berthier, 1997), in sites of the area of Ségou dated 1000–1400 and further west in the Iron age assemblage of Kouroukorokalé near Bamako (MacDonald, 1997). *Knotted strip roulette* impressions, absent or rare in the Gourma, but present in sites of the Lake region and the Delta, are frequent in the early Tellem assemblages of the Cliff, and seem also to be frequent in assemblages of this period in the area of Ségou and Kouroukorokalé (MacDonald, 1997). *Mat impressions* linked to the pounding technique on a concave form, absent in the Delta, the Lake region, the Timbuktu area and the Bandiagara Cliff in early Tellem caves and rare on the Plateau, evidence an influence from the Gourma, where they are frequent in Tongo Maare Diabal and present in Oursi, Kissi, in the area of Koukia along the River Niger (Arazi, 1999), as well as, it seems, at Gao (Insoll, 1996, 2000). Finally, *counter wrapped cord roulette* impressions are rare or absent everywhere, but are present in all levels at the *Promontoire* with a relatively high frequency.

This contrasting image gives the impression of inter-regional contacts, since the majority of the decor types of the Plateau are also observed elsewhere, but it also highlights the originality of each assemblage. What does it mean in terms of historical and cultural influences, and in terms of settlement of the artisans, present behind these ceramic traditions?

Historically, we know that the Bandiagara Plateau was on the edge of the politico-economic sphere of the

Ghana Empire. This first state formation was characterized by a dense occupation, a process of urbanization and socio-professional specialization, long-distance trade, and intense metallurgical activity (Bedaux, 1980; McIntosh, 1998; McIntosh, 1995, 1999; Togola, 1996). Further to the East, on the River Niger at Koukia, the hegemony of the Dia (Za or Ja) dynasties was organized from the beginning of the 7th century AD. This period of formation sees the appearance of Islam, at the end of the 8th century AD and development of complex hierarchies and long distance trade (Bedaux et al., 2003; Insoll, 1996, 2003; Magnavita et al., 2002). From the 13th century AD onwards developed the Mali Empire on a large territory, after battles with Sosso blacksmiths group. Between these political powers were autochthonous populations like Bozo fishermen in the Inland Niger Delta and Bobo on the southern margin, with associated blacksmiths and potters.

Given this level of socio-economic complexity, we consider that the mechanisms of production, use and diffusion of ceramics observed in the present could already be valid in this period. That means that the mechanisms for the specificity of traditions at the level of production, the blending of traditions at the level of consumption and the spatial structure of a tradition linked to the matrimonial and trade networks would be the explanations of the variability of assemblages in the different sites. These assemblages reflect, in variable proportion, the different traditions of the area at that time. By knowing a sufficient number of contemporaneous archaeological sites in the territory, it should be possible to identify the different active centers of ceramic production. Despite the complex phenomena linked to historical dynamics and stylistic evolution of ceramic traditions through time, we think that it is worth considering comparisons with the present.

Comparisons between the ceramics of the Plateau dating from the 7 to 12–13th century AD and actual ceramic traditions seen in the Dogon Country show nearly no resemblance (Table 3). Ceramics formed with the technique of pounding on a concave form over a knotted mat, characteristic of the current tradition of Dogon farming women (tradition A) are found only in very low percentage at the site of *Dangandouloun* (2%) and ceramics decorated with impressions of *Blepharis* sp. cob roulettes, specific to current traditions of blacksmiths on the Plateau (C and D Dogon traditions) are absent (Figs. 8, 9, and 10).¹⁶ This leads to consider the current traditions of the Dogon Country more recent than the 13th century AD.

On the other hand, comparisons with actual ceramic traditions outside Dogon Country show many similarities (Fig. 10). The majority of ceramics show analogies with the forming technique and the decoration tools used today by blacksmith potters linked to Bobo. Their ceramic tradition is today characterized by the technique of hollowing of a lump of clay and the main use of knotted strip roulettes, simple or alternate, to decorate their pots. Bamana potters living south of the Bani River in contact with Bobo villages probably borrowed these decoration tools (but not the technique) after their arrival in this area. As the Bobo constitute one of the indigenous groups of the region, it is quite likely that the Dogon Plateau was part of the production zone for the smiths and potters associated with the Bobo, still living on the Bandiagara Plateau (Fig. 11). This is confirmed by many oral traditions mentioning their former presence at this place. The existence of these decors over the last millennium west of the Bobo living zone remains to be explained. Were these artisans brought to work for the Mali Empire? Or did several early populations in the Mandé world use these decors? The lack of published archaeological data for this area prevents us from going further in the interpretation, but contacts along the Niger River between points as distant as Niāni, the supposed capital of the Mali Empire (situated southeast of Bamako) and the Bandiagara Cliff have already been evidenced by the study of the spatial distribution of three-footed cups (Bedaux, 1980).

Other ceramics, less frequent, show analogies with these produced by actual Somono potters in the Inland Niger Delta, using the technique of molding on a concave form and the braided twine roulette as frequent decorating tool (Fig. 10). The situation is difficult to understand, because the identity of the Somono fishermen-boaters remains uncertain concerning its status (ethnic group or caste) and origin (probably an artificial aggregate of people of different origins by Mali Empire in the 13th century? See Daget, 1949; Jeay, 1980). On the other hand, the Bozo fishermen who first occupied the Inland Niger Delta do not have a social hierarchy, endogamous craftsman classes, and never make pottery today. But we have seen that the braided twine roulette was used in the Inland Delta and Lake region since the beginning of the settlement of fishing people coming from Méma, a region where this decor was found in Neolithic sites during the last two millennia BC (MacDonald and Van Neer, 1994; Rimbault and Commelin, 2001–2002). This décor can be considered typical of this area, being very rare or absent in the Cliff and the Gourma in the past as well as in the present. It should be linked to the production of potters working with the fishermen of the Inland Niger Delta and the Lake region, belonging to the Bozo ethno-linguistic group and deriving from local Neolithic substratum. Some of the sites are important and show intense metallurgical activ-

¹⁶ The unique potsherd showing this decor in *Dangandouloun* was not found in the stratigraphic context and may be considered as a recent contamination.

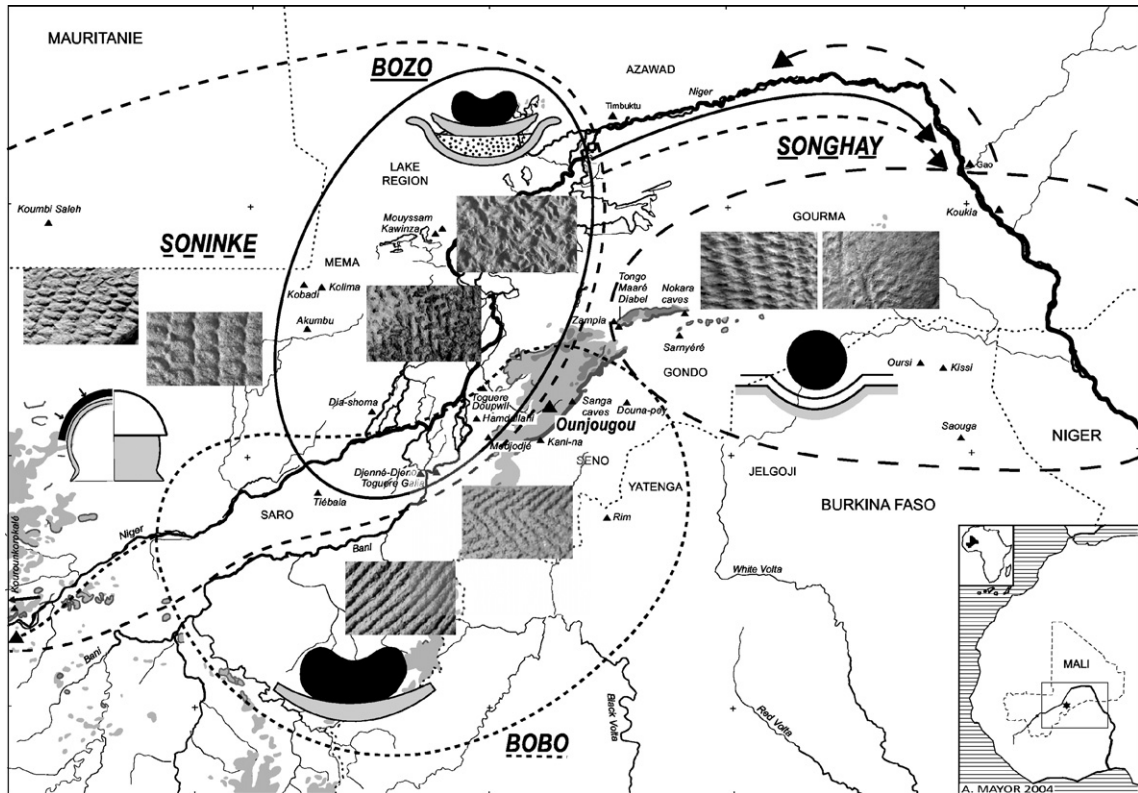


Fig. 11. Interpretation of some ceramic traditions of the Niger Bend during the pre-Dogon occupation of the Bandiagara Plateau (7–13th century AD).

ity, probably related to the Ghana Empire needs. We therefore consider the Bandiagara Plateau as being part of the consumption zone of these potters (Fig. 11).

To our knowledge, accordion-plaited roulette is no more found in the current ceramic traditions of the Niger Bend. We have then to rely on its spatial boundaries in archaeology to propose a cultural attribution. Its strong representation in Kumbi Saleh, the capital of the Ghana Empire, as well as in numerous sites comprised in its territory leads us to think about a possible link between this décor and artisans of the Méma, Delta and Lake region before the Ghana Empire, whose descendant became part of the Soninke of the Ghana Empire, and migrated in the well-known diaspora in most regions west, south and east of Kumbi Saleh, and especially along the River Niger. They could then have been integrated in the Mali Empire artisan groups, explaining the wide distribution of this decoration (Fig. 11).

Finally, a very small number of ceramics of the Plateau show analogies with these produced today by Dogon or Songhay potters, using the technique of pounding in a concave mould over a mat (Fig. 10). A study of clay tampers used to make pottery with the tamper and concave anvil pot-forming technique dem-

onstrates that this uniquely African technique exists and existed in the entire Sahelian zone from Darfur (Sudan) in the East to the Inland Niger Delta (Mali) in the West (Huysecom, 1996b). Sterner and David (2003) propose an origin for it within Nilo-Saharan populations west of Lake Chad, during the Iron Age. This technique would have been spread to the west by or with Songhay (*sensu lato*) speakers, being part of the Nilo-Saharan linguistic family. The borrowing of this technique westward by populations of other linguistic groups, notably in the Inland Niger Delta (Fulbe, Northern Somono, Northern Bamana) and in Burkina Faso (Mossi, Gulmance, etc.) would have only taken place during a later phase, during the past five centuries.

The recent discovery of pottery shaped by pounding on a baobab fibers mat in Gourma, at the sites of Tongo Maaré Diabal, and probably Kissi and Oursi, occupied during the first millennium until 1200 AD, demonstrate the existence of this shaping technique and tool near the Dogon Country much before Tellem and Dogon arrival. We may then suppose that this technique was used in a Proto-Songhay context, and that the Plateau, according the present state of knowledge, was located in the exterior zone, meaning that the rare pots with these mat

impressions discovered at that time should be considered as occasional acquisitions, coming from Songhay speaking populations of Gourma (Fig. 11).

On the Cliff, according to Bedaux and Lange (1983, 1991), the tradition of pounding on a knotted mat would have existed among the Tellem from the 13–14th centuries AD, where it was used only for domestic production, the ritual production being entirely different in both technique and decoration. This chronological and functional attribution is based on a single terminus post quem date of 680 ± 95 BP, that is after 1260–1400 AD* (GX 0233), coming from charcoal from a necropolis without mat impressed ceramics, and on anthropometric analyses of Tellem skeletons, for which we have already stated our reservations concerning the methodology. We think that it is more probable to interpret these two ceramic assemblages as the production of two distinct cultural groups: artisans ancestral to the smiths associated with the Bobo, and artisans associated with the first Dogon, assumed to have arrived between 1230 and 1430 AD according to historical traditions. It is clear that due to the mechanism of blending of traditions at the level of consumption, it is entirely possible that the pottery of these two traditions was used by the same population, the “Tellem,” and perhaps in this case for complementary functions.

One problem is that there is a difference between mats used today by Songhay and Dogon. The former are twisted with palm leaves and the latter knotted with baobab fibers (Fig. 10). It seems that the ancient pottery from Tongo Maare Diabal, Dangandouloun, Bandiagara Cliff, and probably some of Oursi and Kissi as well, were pounded on a knotted mat. We suppose then that the Proto-Songhay potters used the specific baobab fiber knotted mat, but later replaced it with the more common twisted mat. We can observe today such a phenomenon among the Dogon of Tebi Mounde in the Gourma, who lack baobab fiber mats and in place use common twisted mats (Gallay, 2003). As it is not always easy to recognize the type of mat on eroded potsherds or on published drawings, and as the study of the pottery from Tongo Maare Diabal is not yet published, more data are needed to go further in this topic.

The range of frequencies of decorations at the sites of group 1 are very close to what we can currently find in all the villages of the region, that is pots of Dogon A and D traditions. In contrast, the range of frequencies of decorations observed on the sites of group 3, with an abundance of braided twine roulette and knotted strip roulette impressions, as well as the quasi absence of mat impressions, is close to that of archaeological sites of the Plateau, dated from the 7th to 13th centuries AD. In addition, in the case of two sites inhabited successively by the same people, the site of Yabouso inhabited by the Koloun just before their establishment in the current village of Sokolo is part of group 1, the

most recent one, while the site of Saalou, older than Yabouso, is part of group 3, considered as the oldest. An important change in ceramic styles thus intervened between the occupations of these two sites, although inhabited by the same people according to the oral traditions. Intermediate group 2 includes the site of Orosogou, which gives a chronological indication with a date of 1510–1650 AD*.

Then, our hypothesis is that the evolution of ceramic traditions, primarily characterized by the massive appearance of baobab fiber mat impressions and the demise of ceramics decorated with simple or alternate knotted strip roulette impressions, reflects the arrival of Dogon groups between the 13th and the 15th century AD and the retreat of Bobo farmers and their blacksmiths between the 15th and the 17th century. The establishment of the *Tonmo*, *Irin* and other blacksmith clans responsible for Dogon traditions B, C, and D, probably from the 17th century AD, requires further data to be reconstructed (Mayor and Huyssecom, 1999; work in progress by C. Robion-Brunner).

Thus, the interpretation of change in frequencies of the different decor observed on ceramics in the abandoned villages near Ounjougou associates likely chronological and cultural components, these being linked to the identity of the inhabitants as well as the artisans living with them.

This attempt to link specific pottery décor with ethnolinguistic groups is based on detailed ethnoarchaeological studies but relatively scarce archaeological data, and thus remains fragile. New discoveries are likely to modify these interpretations, but this work must be considered as an attempt to go further in the reconstruction of the meaning, in terms of cultural identities, of regional pottery assemblages whose differences are often considered only in terms of chronology or abstract cultural affinities. We are aware of its relative roughness, but we need more data to refine the dynamic processes of ethnicity and technical borrowings between traditions.

Population dynamics in the Dogonland

By way of synthesis, we propose a scenario for the settlement of the Dogon Country over the last 3000 years, based on our results and data obtained in the Niger Bend in the domains of paleoclimatic variations, history, archaeology, ethnoarchaeology, and local knowledge (Fig. 12). As information is still sparse, this scenario is to be refined or debated with new data and dates that will be obtained in the future. Moreover, it is important to remain cautious in general reconstructions, because climatic impacts can be felt very differently by societies exploiting opportunistic strategies and those with a strong economic stability based on a single kind of resource exploitation. The more efficient

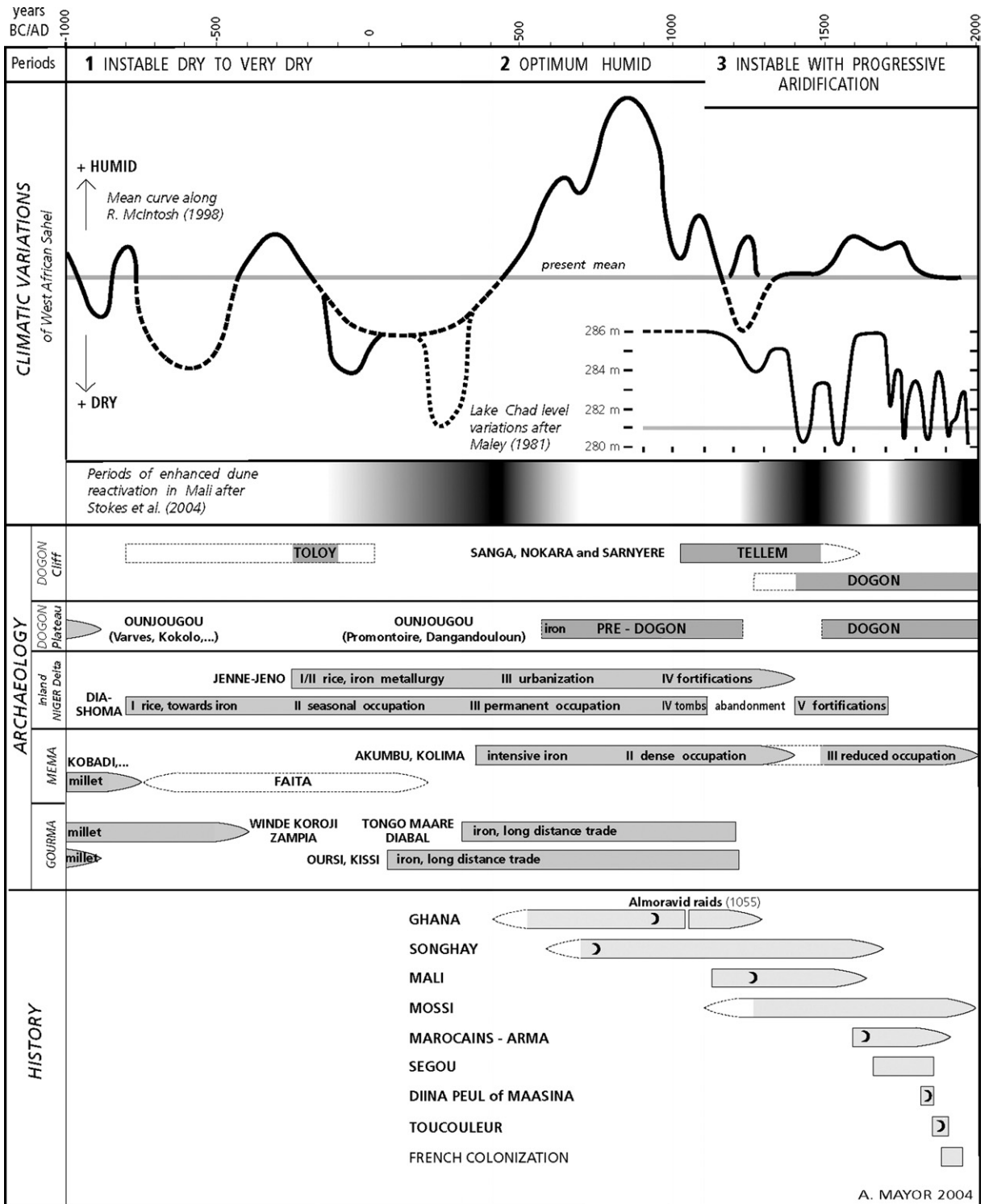


Fig. 12. Schema of climatic variations and human occupations since 1000 BC ('Croissants' in the History section show approximate dates of appearance for Islam).

the exploitation system, the more it demands stability in the availability of the required resources. It would thus be very sensitive to the slightest climatic variation or socio-economic disequilibrium.

The scenario is presented in three main phases, covering the period from 1000 BC to 1800 AD, approximately divided according to broad paleoclimatic variations. It begins in 1000 BC, although at this period no occupation is known in the Dogon Country. This choice is justified by the need to better understand the dynamics of regional settlement, at a period during which the general current arid conditions were established in the southern Sahara, and the techno-socio-economic conditions that would trigger the emergence of the first states were first put in place. The scenario ends in 1800 AD, a period when the majority of the Dogon clans were established on the Plateau. The more recent events are another story.

Concerning the archaeological data on the settlement of the Niger Bend, we have used, in the absence of other indications, the publications of S.K., R.J. McIntosh, and R. Bedaux et al., for the Inland Niger Delta, R. Bedaux et al., for the Cliff of Bandiagara, T. Togola, and K. MacDonald for the Méma, and T. Insoll, K. MacDonald, and S. Magnavita for the Gourma.

Phase 1: 1000 BC–300/400 AD—Unstable dry to very dry period

This period is marked by a discontinuity in Sahelian settlement that can be related to environmental instability leading to increasing aridity, and a response in some places with the diversification of food production economy and the beginning of iron metallurgy. In the Dogon Country, the Plateau seems not suitable for agricultural practices at that time, and the Toloy remains in the caves of the Cliff do not show any evidence of cultivated products or iron items.

This period follows a major climate break in the Late Holocene, at least in the Sahel and the Sudan, because in the Sahara it occurs earlier. The arid nature of this phase in comparison to the previous periods is not only known on a global scale (Marchant and Hooghiemstra, *in press*), but also by abundant local evidence.

On the Bandiagara Plateau, the Late Neolithic occupation of Ounjougou-Varves (on the right bank of the Yamé), well-identified chronologically, ends around 1000 BC (Huysecom et al., 2004b, *in press*; Ozainne et al., 2003); the above sedimentary levels, dated between 1050 and 910 BC* and 1010–890 BC* are sterile, as is the lower level of the Promontoire (level 7 under the protohistoric levels) dated to 760–400 BC*. Thus, at present, there is no evidence of human occupation on the Plateau during this phase, which seems to correspond to a hiatus, which is cultural and not depositional, and corresponds to the regional increasing of aridity. It is

however possible that there was not a complete desertion, but only a phenomenon of sharp reduction in population density, or a change in form and location of human settlements, going from a more sedentary agricultural way of life to a more mobile one, temporarily dominated by animal husbandry.

On the Cliff, in contrast, Toloy remains, dated to the 2nd–3rd centuries BC, were found in caves used to shelter granaries and food supply. However, the chronology of this occupation is not very precise: the two dates on charcoal trapped in the granary walls, 2340 ± 115 (GX 0231) and 2130 ± 150 BP (GX 2888), give only a terminus post quem, and the calibration of these dates indicates a very long time interval (800 BC–10 AD*). Whatever the case, this occupation must have taken place some time during this dry phase. Plant remains, discovered in association with the granaries, reveal only wild plants and there is no evidence for iron. But archaeological remains are not numerous and this absence is not necessarily meaningful. The pottery shows affinities with those used during the first millennium BC in the Méma and at Dia-shoma.

In the other regions of the Sahelian zone, we observe the same phenomenon of abandonment of Late Neolithic sites during the first millennium BC. This is the case for the villages of the Dhars Tichitt-Oualata in southern Mauretania, whose inhabitants have moved southeastwards to the Dhar Nema and the Méma (MacDonald et al., 2003; Person et al., 1996). The mound of Dia-shoma, located on the edge of the Inland Niger Delta in a more favorable position, seems to have been occupied from 800 BC and show evidence of rice cultivation (Murray, 2004). The first horizon (800–300 BC) contains a ceramic range demonstrating important affinities with the Late Neolithic of the Méma, as well as slag and iron objects, but the second horizon (300 BC–300 AD) shows an occupation probably limited to seasonal visits in some sectors of the site (Bedaux et al., 2001).

The Inland Niger Delta, where the water was lowered sufficiently to expose the summit of natural mounds and offer new living space, is first colonized at the end of this period. Phases I/II of Jenné-jeno are dated from 250 BC to 400 AD. The village, built of wattle and daub houses, grew from 12 to 25 ha between 100 and 400 AD. The subsistence economy was based on rice (*Oryza glaberrima*), sorghum, and millet, the raising of cattle, sheep, and goats, hunting of antelope, and fishing. Iron metallurgy is attested, as well as long-distance trade. Important habitations were also established in the lake region during the first centuries AD, showing the importance of the retreat of water (McIntosh and McIntosh, 1980).

In northern Burkina Faso, living sites and burials concentrate around the ponds of Kissi and Oursi beginning in the 1st century AD, and demonstrate a radical change in settlement and subsistence strategies after

the abandonment of sites during the 1st millennium BC (Breuning and Neumann, 2002a). The intensification of pastoralism, the diversification in cultivated species and the development of an agro-forestry system, all of which accompanied the process of sedentarization, can be observed (Kahlheber et al., 2001). This shift can be linked to the changing climatic conditions documented locally, notably in Lake Oursi, whose deposits record a high frequency of drying with a retreat of species typical of permanent lakes (Ballouche and Neumann, 1995).

Phase 2: 300/400–1000/1100 AD—humid optimum

The emergence of the first empires, the demographic explosion, the intensive development of agriculture and iron metallurgy, probably associated with the needs of the first Empires, the long distance trade and the expansion of settlement in the less favored zones such as the Bandiagara Plateau, were certainly helped by the abundance of natural resources due to climatic improvement during these few centuries. Goods circulation is attested between pre-Dogon people of the Bandiagara Plateau and people living in the direct sphere of influence of the Ghana Empire and Dia dynasties.

Several local data show that this period marks a humid pulse between two drier periods. There is, however, no evidence for a dense wooded Sudanian vegetation, but only for some Sudanian elements in a floristic context that remains Sahelian, as shown at Saouga in northern Burkina Faso around 1000 AD (Neumann et al., 1998).

With this favorable phase, we enter the historical period. The Ghana Empire (or Wagadu) is the first political formation to be developed in the southern Sahara probably from the 4th century AD (Bathily, 1975; Dieterlen et al., 1992). A typically animist system of thought served as the foundation for this power, but the influence of Islam was felt from the 10th century AD, as evidenced by the construction of a large mosque in Kumbi Saleh, perhaps to be identified with the capital (Berthier, 1997; Insoll, 2003). The zone of influence of this Empire included the Méma, a part of the Inland Niger Delta and the lake region, but it probably did not cross the Niger River to the southeast, leaving the Dogon Country on its margin.

Further to the east, on the Niger River, oral tradition tells us that the hegemony of the Dia (Za or Ja) dynasties was organized at Koukia beginning in the 7th century AD, from a proto-Songhay people, though archaeology indicates that Gao was already occupied from the 6th century AD (Insoll, 1996, 2003). Islamization begins in the late 8th—early 9th centuries AD.

While at the Cliff, this period seems to be marked by a long occupation hiatus, pre-Dogon populations arrived on the Bandiagara Plateau a little after the beginning of this favorable period: the first occupation level of the *Promontoire* site dates to 660–720 AD*, and the earlier pottery from the *Dangandouloun* rock shelter have

been dated by thermoluminescence to 610 ± 50 AD. The numerous common iron objects suggest a local metallurgy. The large quantity of pottery formed with the technique of hollowing a lump of clay and decorated with simple or alternate strip roulette impressions probably indicates that the Plateau was part of the production zone of the ancestors of the current Bobo blacksmiths. Other less frequent ceramic decorations, like impressions of braided twine roulette, indicate that the Plateau was part of the consumption zone of the tradition of potters linked to fishermen of the Inland Niger Delta, ancestral to the today tradition of the Somono potters. Finally, rare mat impressions show occasional commercial relations with artisans of the Gourma, whose tradition was probably linked to Nilo-Saharan populations, ancestors of current Songhay. The many ritual three-footed bowls, meticulously made with different kinds of decorations, evidence contacts between distant regions: Niani in the Upper-Niger (Filipowiak, 1979), Rim in northern Burkina Faso (Andah, 1980), Tiébala (Curdy, 1982) and Jenné-jeno phase III in the Inland Niger Delta, to mention only the early bowls dating to the second half of the first millennium AD. Thus, long distance contacts along the River Niger is documented during the Ghana Empire and Dia dynasties, as well as good circulation between different zones controlled or not by the hegemonic powers, but direct influence of the latter are not perceptible in archaeological record.

In the Inland Niger Delta, this period is characterized by maximal occupation density, with emerging urbanization and economic specialization. Toward 800 AD, the town of Jenné-jeno, built with banco huts, reaches its maximal extension with 33 ha, and long-distance trade is attested by the importation of copper (around 500 AD), from sources more than 300 km away, and gold (around 900 AD), from at least 600 km away. At Diashoma, the occupation again becomes permanent, and in the Méma region, 109 sites of 137 identified during survey are attributed to the Iron Age and go back to the 4th and 5th centuries AD. Sites of the Lake region, part of the Ghana Empire, also show intense metallurgical activities, probably linked to the increasing needs of the Empire. In southern Gourma (Burkina Faso), long-distance trade (copper, cornaline beads, cowry shells. . .) is also attested, along with the use of horses and the social importance of warriors, reflected in very rich graves. These settlements might be linked to the development of the Dia dynasties, along the River Niger, not far eastwards.

Phase 3: 1000/1100–1800 AD—Unstable period with progressive aridification

Once again, climatic factors, this time unfavorable, seem to have influenced the Sahelian settlement. It is probable that such factors can at least partially explain the decline of the Ghana Empire, as well as the move

or decline and abandonment of the sites of the Méma, Gourma, Inland Niger Delta, and Dogon Plateau. But the human impact should not be neglected, as the demographic rise and intense metallurgic activity during the preceding centuries could have weakened the Ghana Empire due to exhaustion of its resources. Moreover, the insecurity linked to conflicts between complex local powers and Empires (Mali, Songhay, Moroccans, Mossi, Bamana of Ségou, Fulbe, and Tuaregs) probably provide better reasons for abandonment or fortification of certain sites, for emigration to refuge zones, and for extending onto the Plain or retreating to the Cliff in the case of the Dogon facing Songhay and Mossi pressures. On the Bandiagara Plateau, according to oral traditions, political insecurity of the last two centuries seems to be associated on one hand with the slave demands of the warriors of the Ségou kingdom and the raids of the Fulbe horsemen, but on the other hand also to conflicts between Dogon clans themselves, in relation to economic difficulties linked to demographic growth and environmental pressures in an area not very conducive to agriculture.

In the 11th century, a continuous trend towards aridification begins, despite a certain instability. In contrast to the schema developed by R. McIntosh showing a second humid period starting in the 15th century, a certain number of evidences suggest an accentuation of aridification. These are the retreat of savannah formations and the degradation of the riparian banks along the ponds in northern Burkina Faso (Ballouche, 2001; Ballouche and Neumann, 1995), as well as the reactivation of the dune fields in the Malian Gourma 500–600 years ago (Stokes et al., 2004). Variations in the level of Lake Chad permit distinction of two phases: the first (15–16th centuries) marked by significant regressions, and the second in the 17th century during which the lake recovered levels comparable to those during the 1st millennium AD before undergoing regressions leading to current conditions (Maley, 1981).

The decline of the Ghana Empire begins in the 11th century AD, with its fall in the 13th century, when the Mali kingdom emerges. The conjunction of politico-religious and natural events forced the Soninke to move in a broad diaspora to the southwest and southeast, toward the Niger valley, specifically to Dia and Jenné where they would have joined other Soninke (or Nono) already established there. During this period, the Mali Empire founded in the 13th century AD reached its greatest power a century after and covered a zone from the Atlantic Ocean to Agadez, but it does not seem to have included the Dogon Country. Oral traditions indicate that the origin of migration of the first Dogon groups resistant to Islam was chased by one of the Mali kings, Sunjata Keita or Mansa Moussa.

In the Songhay domain, dynasties changes from the Dia to the Sonni and the Askya, and major problems,

mainly religious crises linked to Islamization and relationships with the new Mali Empire must be addressed. The Dogon Country experienced the effects of Songhay expansionism during the campaigns of emperor Sonni Ali, whose warriors captured the Bandiagara Plateau between 1467 and 1484. *Saman* people were exiled to Kani, at the base of the Cliff, in 1469 by the inhabitants of Jenné (Holder, 2001). The Songhay power was still firm on the Middle Niger with the campaigns of Askia Mohammed I (1493–1528), such that the Hombori region becomes a province of the Empire. Several expeditions against the Northern Dogon were also undertaken in 1555–1565, 1564 and 1579 (Delafosse, 1912; Rouch, 1953). The Songhay raid of 1609 against Jenné increased the insecurity on the Delta, and part of the population moved to the Bandiagara Plateau.

From the southern side, Mossi warriors reached the White Volta basin and exercised pressure on the Dogon of the Plain under the reign of Naaba Rawa (1470–1500). They controlled the territory on the modern border of Mali, causing the retreat of the Dogon to the Cliff, with the exception of the blacksmiths, taken care of by invaders for economic reasons (repair of iron weapons in war times). The first half of the 16th century saw the end of the Mossi advance to the north, but did not prevent slave raids in the Dogon Country (Izard, 1985).

Marked in the 17th century by the ravages of the Moroccan occupation, insecurity, pillages, and famines, the Middle Niger witnessed a somber period in its history. Numerous populations found refuge in the mountains. At first, the Moroccan conquest (1591–1593) focused on the zone along the length of the Niger, but in 1594, Pacha Mahmoud launched an expedition against Hombori, where he died. From 1653, in a second migration, the *Saman* allied with the Jenné inhabitants in rebellion against the Arma leaders (mixed descendants of Moroccan invaders) moved on to the Bandiagara Plateau. Their descendants (surname Kansaye and Kamia) would found the fortified Muslim city-state of Kani-Gogouna in the 18th century.

In the 18th century, Ségou controlled the Delta south of Lake Débo, as well as the right bank of the Bani. The southwestern Dogon Country served as a predation zone for the Ségou warriors. At the same time, the Tuareg consolidated their presence along the river north of the Middle Niger. The Oulliminden became established in the Gao region in 1680, seized from Timbuktu in 1787, and progressively take possession of Gourma. Their raids constituted a new menace for the inhabitants in the northeast part of the Dogon Country. Finally, the movements of Fulbe pastoralists from the Inland Niger Delta were intensified in the middle of the 17th century, and went through the Dogon Country. The Fittobé who migrated from Lake Débo to Yatenga in the 18th century contributed to prevent the Mossi advance toward the north (Izard, 1985).

The pre-Dogon occupation of the Bandiagara Plateau sites appears to have been interrupted at the beginning of this instable dry phase, both at the *Promontoire*, where the last level yielding material was dated to 1040–1220 AD*, and at *Dangandouloun*, where the most recent TL date for the ceramics is 1180 ± 40 AD.

The Cliff was reoccupied after a probable long hiatus by the “Tellem” (phase 2 of the Cliff), exploiting the caves to establish religious places and collective burials, sometimes in Toloy granaries or behind walls built of mud bricks with lozenge-shaped profiles. The living zones of this population are not known. Four radiocarbon dates from the bones of two burial caves range between 895 ± 95 BP (GX 0470) and 655 ± 125 BP (GX 0232), that is from 1030–1220 AD* to 1250–1430 AD*. The pottery, found only in ritual caves, include footed cups and small bowls, quite similar to those, older and contemporaneous, discovered at *Dangandouloun*. An hypothesis suggests a migration of pre-Dogon people from the Plateau to the base of the Cliff and a change of location of the ritual and burials places, perhaps in response to climatic instability and droughts, which made survival on the Plateau too unpredictable.

Archaeological facts to understand the first Dogon settlement are unfortunately still poorly dated. On the Plateau, a date of 340 ± 35 BP (Ly-9337), or 1490–1640 AD*, clarifies the chronology of the mudflow overlying the deposit of ritual ceramics at *Dangandouloun*, and a date of 315 ± 40 BP (ETH-24060) situates the occupation of the abandoned village of Orosogou (group 2) to the same time, around 1510–1650 AD*. The study of ruined villages known from oral traditions permits the outline of the development of ceramic traditions. The evolution of ceramic decoration is notably characterized by the explosion of the number of pottery showing mat impressions at sites of the group 2 (middle) and 1 (recent), the abandonment of pottery decorated with simple or alternate knotted strip roulette impressions at sites of group 1, and the presence of ceramics decorated with braided twine roulette impressions at all the sites. We showed that this could reflect the arrival of Dogon groups, the retreat of the ancestors of Bobo and their blacksmiths, and the long-lasting relations with the Inland Niger Delta artisans. The current controversy over the identity of the occupants of some villages of group 2 (middle) and 3 (ancient) is interesting insofar as it probably reveals a transition between different peoples or a phase of co-existence, possibilities that give each material for different interpretations. Oral tradition concerning the history of settlement around the site of Ounjougou reveals several successive phases of Dogon population, which led to the foundation of most of the current villages probably between the 16 and 18th centuries. Episodic droughts documented by written and oral sources can explain some of the numerous village relocations.

At the Cliff, phases of occupation, termed phases 3 and 4 by R. Bedaux (or Middle Tellem and Late Tellem/Dogon), are each situated chronologically by a single date, a terminus post quem of 680 ± 95 BP (GX 0233), that is after 1260–1400 AD* for phase 3, and a date on bone of 390 ± 85 PB (GX 0795), or 1440–1630 AD* for phase 4.

R. Bedaux’s phase 3 of the Cliff demonstrates a certain continuity with the preceding phase (Early Tellem) in the anthropometry and certain aspects of the material culture, but demonstrates a break, with the appearance of important new elements: the caves are no longer used only for burials and rituals, but also to store foodstuffs; circular granaries in unfired bricks appear, and some materials change (the wooden headrest is replaced by iron and the leather loincloth by cotton pants), as do ceramic production techniques with the appearance of ceramics made by pounding on a concave form over a knotted mat. R. Bedaux interprets this phase as a middle Tellem occupation, mainly on the basis of anthropometric data. But these data would need re-evaluation with a modern statistical approach before considering these inferences in terms of ethnic identities. Moreover, pottery was not found in the caves that yielded dates and human bone remains. In our view, important change in material culture reveal more probably the arrival of the first Dogon between 1230 and 1430 and their cohabitation with the previously established Tellem, who may continue to bury their dead in the caves of the Cliff.

R. Bedaux’s phase 4 still shows an anthropometric continuity, but new changes occur in architecture (granaries are now quadrangular, built of stone and lined with clay) and in the material culture (for example the disappearance of the headrest). R. Bedaux interprets this as the first transition phase between the Tellem and the Dogon. We consider this rather to be a second wave of Dogon settlement, which could correspond to the retreat of the Dogon on the Plain, due to Mossi pressures during the reign of Naaba Rawa at the end of the 15th century AD.

Elsewhere, the majority of sites of the southern Delta were abandoned between 1100 and 1400 AD. This is the case of the city of Jenné-jeno and its satellites. After an important demographic decline, the Inland Niger Delta was peopled with Fulbe pastoralists and Bamana farmers. In the Méma, after an occupation hiatus in numerous sites, rare limited sites are found in the dune fields, inhabited after the 16th century (presence of tobacco pipes¹⁷) and attributed by oral tradition to the establishment of Bamana farmers. At the site of Kolima, the exploitation of deep channels for fishing could reflect the sharing of ecological niches between the Bozo and

¹⁷ For the question of tobacco pipes in the region, see the review of McIntosh et al., 2003.

the Somono (MacDonald and Van Neer, 1994). At Dia-shoma, a hiatus can be observed between 1100 and 1400 AD, followed by an occupation until 1700 AD, which is characterized by a concentration of loaf-shaped and quadrangular brick houses, fortified by two parallel zig-zagging walls. Sites of Gourma (Tongo Maare Diabal, Oursi, Kissi) were also abandoned during this period.

Conclusion

The Dogonland showing a high rocky plateau, a sheer escarpment and a sandy plain in the Sahel zone, on the margin of the celebrated medieval empires, long played the role of refuge, creating a complex settlement history, marked as much by the historico-political dynamic of the Niger Bend as by the recurrent climatic instability in the southern border of the Sahara. The correlation of data of different types (paleoclimatology, archaeology, ethnoarchaeology, and local knowledge) leads to a better understanding of phenomena and to formulate a scenario that can be refined or questioned by future research. Much remains to be done in order to have a coherent encompassing image for the region, notably in the Seno Plain.

Our archaeological work at sites on the Bandiagara Plateau, at Ounjougou, have partially filled the occupation gap observed at the Cliff between the Toloy occupation during the 2nd and 3rd centuries BC and the arrival of the so-called Tellem populations in the 11th century AD. Our in-depth ethnoarchaeological studies of today ceramic traditions of the Dogon Country and the Inland Niger Delta, coupled with ethnohistorical data, clarify the historical depth of some of the regional ceramic traditions, and infer from them hypotheses on the populations as well as the settlement history, with all the caution required by such an approach. An ethnoarchaeological model of pottery circulation has also produced hypotheses on the type of relations established between the Bandiagara Plateau and the other regions of ceramic production. The correlation of ethnohistorical, archaeological, and paleoenvironmental data has revealed that climatic variation had a strong influence on regional beliefs, particularly on stereotypes rendering an account of colonization and abandonment of villages and territories. It also showed that the Bandiagara Plateau was occupied mostly during humid periods and deserted during important droughts. During the arid phase from 1000 BC to 300/400 AD, this region lacks any evidence for human occupation, although sediments corresponding to these periods are present. Pre-Dogon groups were established a little after the beginning of the humid optimum, at the 7th century AD, but this occupation was interrupted at the beginning of the instable dry phase at the time of the severe droughts of the 11–12th centuries AD. Some time after this, between the 13th and the

15th century AD, arrive the first Dogon at the base of the Cliff in climatic conditions probably still better than today and in an environment much more preserved.

It is interesting to see that further back in time, archaeological remains seem also to be present only during humid phases, that is: early Neolithic (10–8th mill. BC), associated with the Early Holocene climatic improvement, Middle Neolithic (5–4th mill. BC) associated with the second Middle Holocene pluvial, and the Late Neolithic (3rd–2nd mill. BC) also associated with a wet phase. In contrast, a cultural hiatus characterizes the periods of aridity, such as the Ogolian arid at the end of the Pleistocene and the dry period between the two Holocene pluvials.

The base of the Cliff seems to have played the opposite role of refuge during dry periods, as is shown by the Toloy remains during the dry period of the 1st millennium BC and by the early Tellem occupation dating to the 11th and 12th centuries AD, a period coinciding with the brutal decrease in precipitation after the humid optimum. In fact, the presence of water was possible at the Cliff, and thus the presence of man, even during periods regionally considered as dry. The Cliff zone could represent the “last refuge” for precipitation associated both to the orographic effect and to the rains from the squall lines in the east. These factors could contribute to the maintenance of permanent water sources and rain sufficient to benefit slope agriculture.

These results put in historical perspective the current difficulties of the Dogon farmers on the Plateau during a period of aridity and instability. They show that people were used to cope with climatic uncertainty and had to move frequently in search for water and cultivable fields, at times when demography allowed such a strategy.

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