



HAL
open science

Dia Shoma(Mali), a medieval cemetery in the inner Niger delta

V. Zeitoun, E. Gatto, H. Rougier, S. Sidibé

► **To cite this version:**

V. Zeitoun, E. Gatto, H. Rougier, S. Sidibé. Dia Shoma(Mali), a medieval cemetery in the inner Niger delta. *International Journal of Osteoarchaeology*, 2004, 14 (2), pp.112-125. 10.1002/oa.716 . hal-02977684

HAL Id: hal-02977684

<https://hal.science/hal-02977684>

Submitted on 25 Oct 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Dia Shoma (Mali), a Medieval Cemetery in the Inner Niger Delta

V. ZEITOUN

UPR 2147 du CNRS, Paris, France

E. GATTO & H. ROUGIER

UMR 5809, Laboratoire d'Anthropologie, Université Bordeaux I, Talence Cedex, France

S. SIDIBE

Musée National du Mali, Bamako, Mali

Abstract

The aim of this paper is to compare burial typology from Dia Shoma medieval cemetery (Mali) with previously documented funerary practices of the inner Niger delta in order to expand our knowledge of the mortuary rituals once practised in this region. Considering archaeological resources from an anthropological viewpoint provides us with new information about human migration, settlement, cultural affiliation and way of life. From this point of view, especially for the period between 800 and 1000 AD, Dia Shoma offers much insight into the history of this cultural melting pot. Dia Shoma is of particular interest in regards to migration in the Western Sahara region. The burials of Dia Shoma have been characterized by morphometrical features as well as associated funeral practices. The different types of burials that coexist at Dia Shoma indicate a region of cultural diversity. Along with the existence of different kinds of tombs, an increase in various archaeological remains lends evidence towards a community co-occupied by herders, fishermen and farmers. The change in the association of funerary practices around 1000AD could be interpreted as an indirect disturbance to the former socioeconomic trade and cultural exchange, possibly triggered by the fall of the Empire of Ghana under the influence of the Almoravides

Key words: field physical anthropology; funerary practices; inner Niger delta; 800–1000 AD; cultural diversity

Introduction

An inventory of the archaeological resources in Mali has been underway for many years by the Institut des Sciences Humaines (Raimbault & Sanogo, 1991). In accordance with this endeavour, we focused on funerary practices in the inner Niger delta for the relevant insight they offer into past societies. From an anthropological point of view the medieval cemetery of Dia Shoma reveals many clues into the history of this regional melting pot of sedentary and nomadic populations that characterized the inner part of the delta over centuries (Kiethega et al., 1993). Field physical anthropology provides information that allows us to define ten different kinds of burials between 580 and 1160 AD. The melting pot can be recognized by the coexistence of several kinds of tombs but the strongest fact is that the change of the association of burials and the change relevant to the archaeological remains through time can be associated to modifications of the socio-economic pattern that could be linked to well known historical events.

A favourable context

Favourable climatic and water supply, which occurred in the largest portion of Mali 3000 years ago, gave this country one of the richest archaeological heritages in West Africa. The wide course of the River Niger runs through the savannah and Sahelian regions, its inner course forming a delta that has favoured human settlement for centuries (Raimbault & Sanogo, 1991). The history of the region of the lakes and of the inner Niger delta is linked to that of former western Sudan with the successive Empires of Ghana, Mali and Songhay (Dembélé, 1991). Their economic development had been dependent over centuries upon this area that was an important agro-pastoral and fishing reserve. Additionally, this water system provided a favourable route for trade between the southern and northern Sahara. The Empire of Ghana existed during the second part of first millennium (500–1000 AD). Dia was at its eastern edge (**Figure 1**) when the Muslim Almoravides violently brought about the destruction of the Empire. Despite the fall of the Empire, many of its settlements endured. At this time the north was controlled by the nomadic Berbers and Moors, while the 'Soninke' sedentary farmers inhabited the southeast.

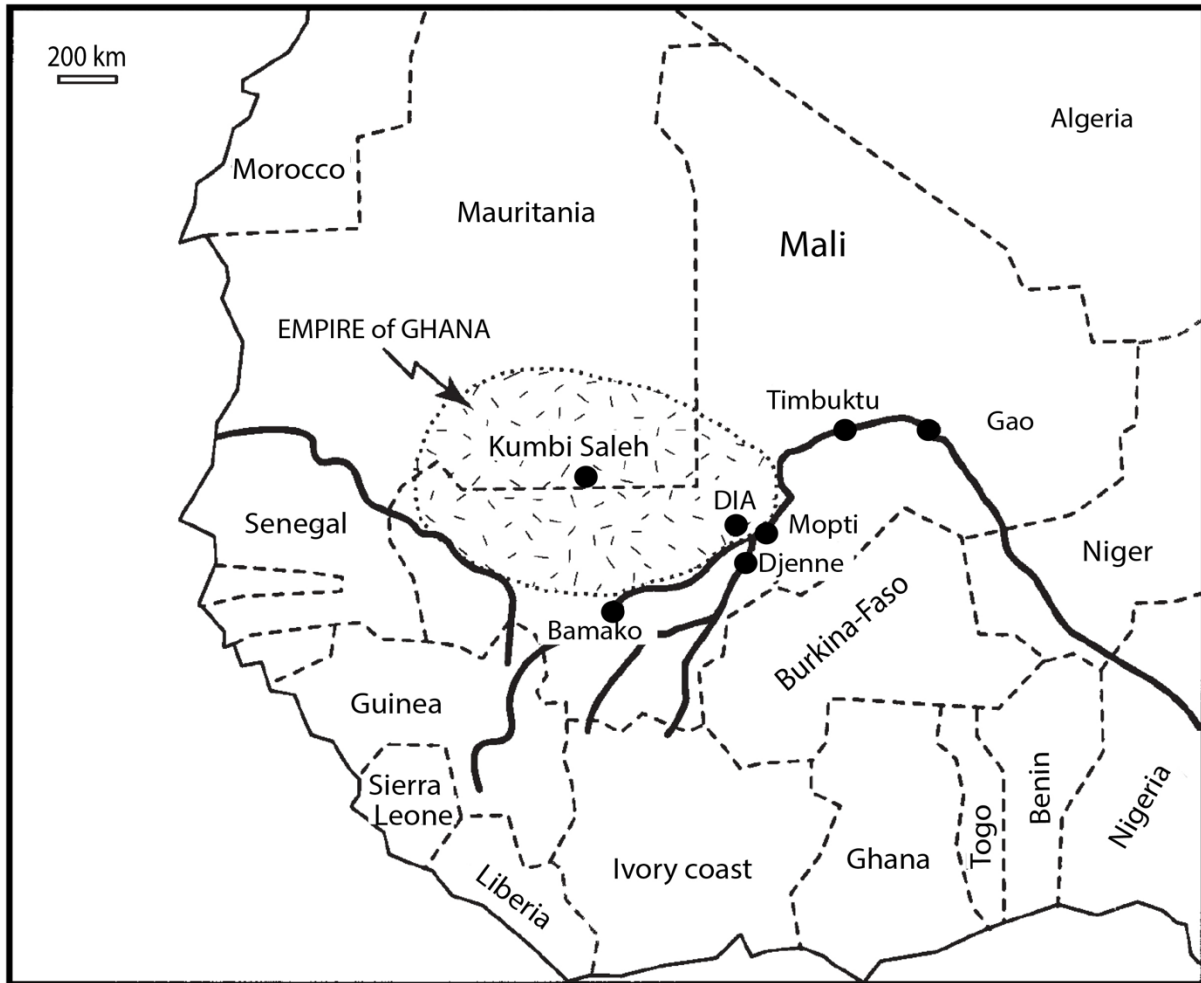


Figure1. Location of the Empire of Ghana (according to Dembélé, 1991).

Funerary archaeology

Since the 1950s and the works of Szumowski (1957) and Mauny (1951, 1961), most of the archaeological discoveries in the inner Niger delta have been funerary sites such as Diguiguiba, the medieval cemetery of Gao and many tumuli in the area of Niafunke and Goundam (**Figure 2**). Between 1964 and 1972, Bedaux excavated sepulchral caves in the region of Sangha, Nokara and Hombori (Bedaux et al., 1978). Many tumuli on the plateau of Ntondomo (Dembélé & Raimbault, 1991), and several cemeteries were also discovered in the Mema, Kareri and Farimake areas, and more precisely at Kobadi (Nampala), Kolima Karaguile' and Tiabel Poddi II (Togola & Raimbault, 1991). In this region, different kinds of funerary sites have been found (Kiethega et al., 1993): - tumuli in the north at Killi, El Oualadji or Tondidarou where megalithic stones are reused (Fontes, 1991); - extended or squatting bodies inhumed in a cemetery at Gania (Mopti) or Gao where two brick tomb complexes and a famous series of engraved tombstones have been described (Flight, 1975; Insoll, 1996); - and inhumations in jars in Toguere Galia, or a field of funerary urns in a metallurgic context in Koina (Mopti). This regional variety of mortuary practices is contemporaneous with the cemetery of Dia. The site of Kouga is dated between 1020 and 1160 AD, El Oualadji between 1040 and 1190AD and the megalithic site of Tondidarou between 680 and 780AD (Saliège et al., 1980). At Tondidarou the tumulus was probably built during the first Muslim incursion of Habib Ben Abi'Ubaida (734 AD) close to the current Malian border (Fontes et al., 1991). The hill of Toyla dates to between 890 and 980AD (Fontes, 1991), while the Toguere Doupwil dates between 1020 and 1160AD and Toguere Galia between 1010 and 1160AD (Bedaux et al., 1978). The cemetery of Gao began to be used in the middle of the 9th centuryAD (Insoll, 1996). Further to the northeast, the hill of Kawinza is dated to between 710 and 1000AD (Sidibe' & Raimbault, 1991).

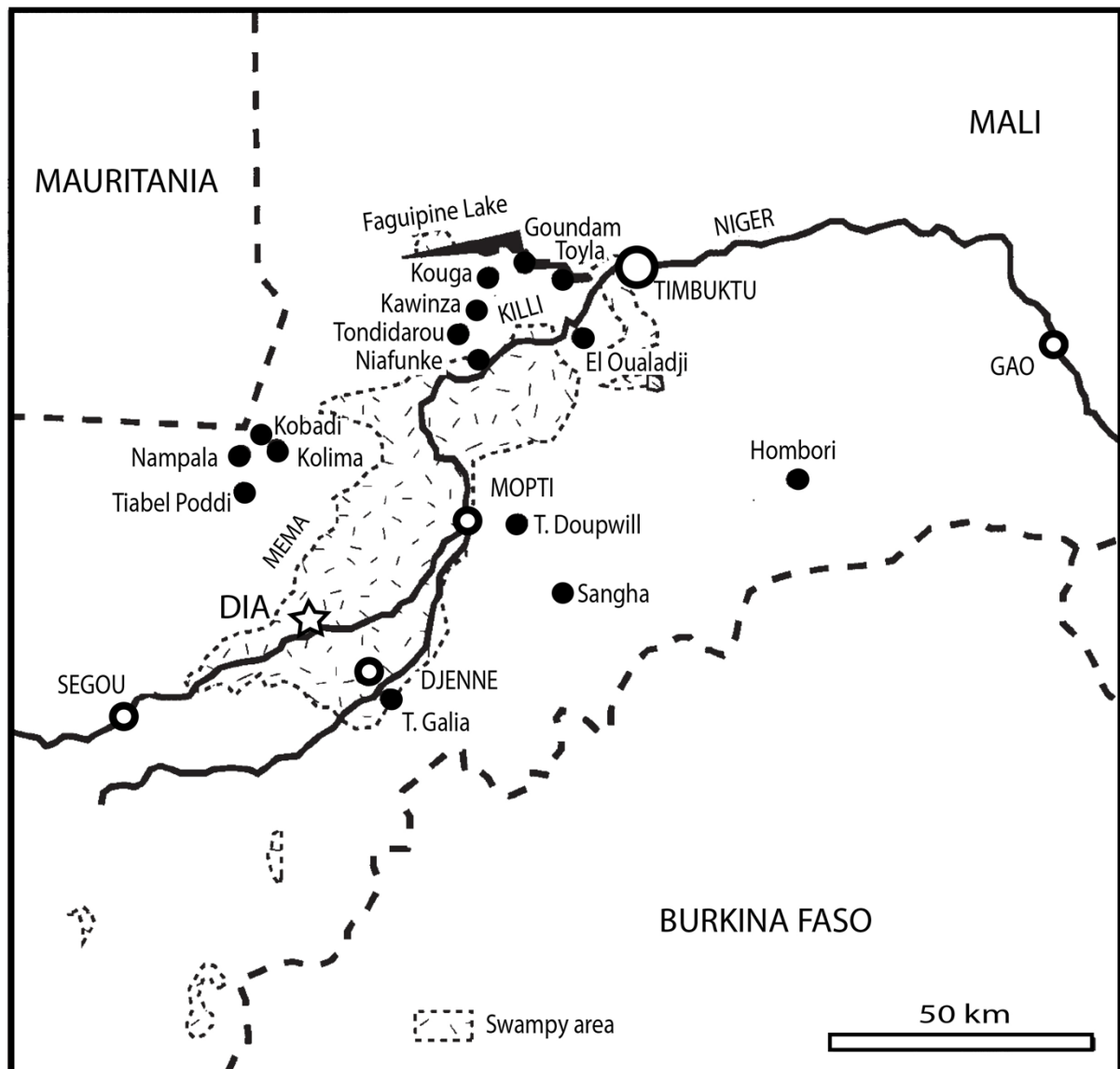


Figure 2. Main funerary sites of the inner Niger delta between 500 and 1100 AD.

The cemetery of Dia Shoma

The site of Dia Shoma, formerly described by Bedaux et al. (2001), has yielded about 100 individuals (**Figure 3**) and may contain many more; it thus appears to be one of the most important archaeological funerary sites of West Africa. Preliminary fieldwork indicates that ten different kinds of burials coexisted within a single place (**Figure 4**). A bioanthropological analysis was carried out in the Musée National in Bamako (dental age estimation) and in the field (bone measurement and sexing) during the first field seasons of 1998–2001 with regard to the stratigraphic sequence and the surface covering of the cemetery. Some 50 individuals were discovered in the soundings, and 41 on the surface (**Table 1**). For each kind of tomb, all the individuals were very badly preserved in quality (about 90% had splintered bones due to the natural conditions of the area, only nine skulls were quite complete and can be preserved using acetate of vinyl) and quantity (only 14 skeletons were ‘complete’). Because of the very poor preservation of the material, the anthropological analyses were extremely restricted. Very few metric and morphological parameters could be observed, a crucial factor when determining the age, sex, and stature of the individuals. These parameters are also important when determining the health status of a population. The age of the children was assessed using the dental aging chart of Ubelaker (1984). Two main problems existed when determining the age of the remaining classes. First, the poor preservation of the skeletons made it impossible to distinguish whether they were adults or old adolescents (no preservation of the skull nor the epiphyses of the long bones). Second, no reliable method for determining an adult’s age at death is applicable (no coxal bone, no epiphysis nor skull and tooth preserved enough).

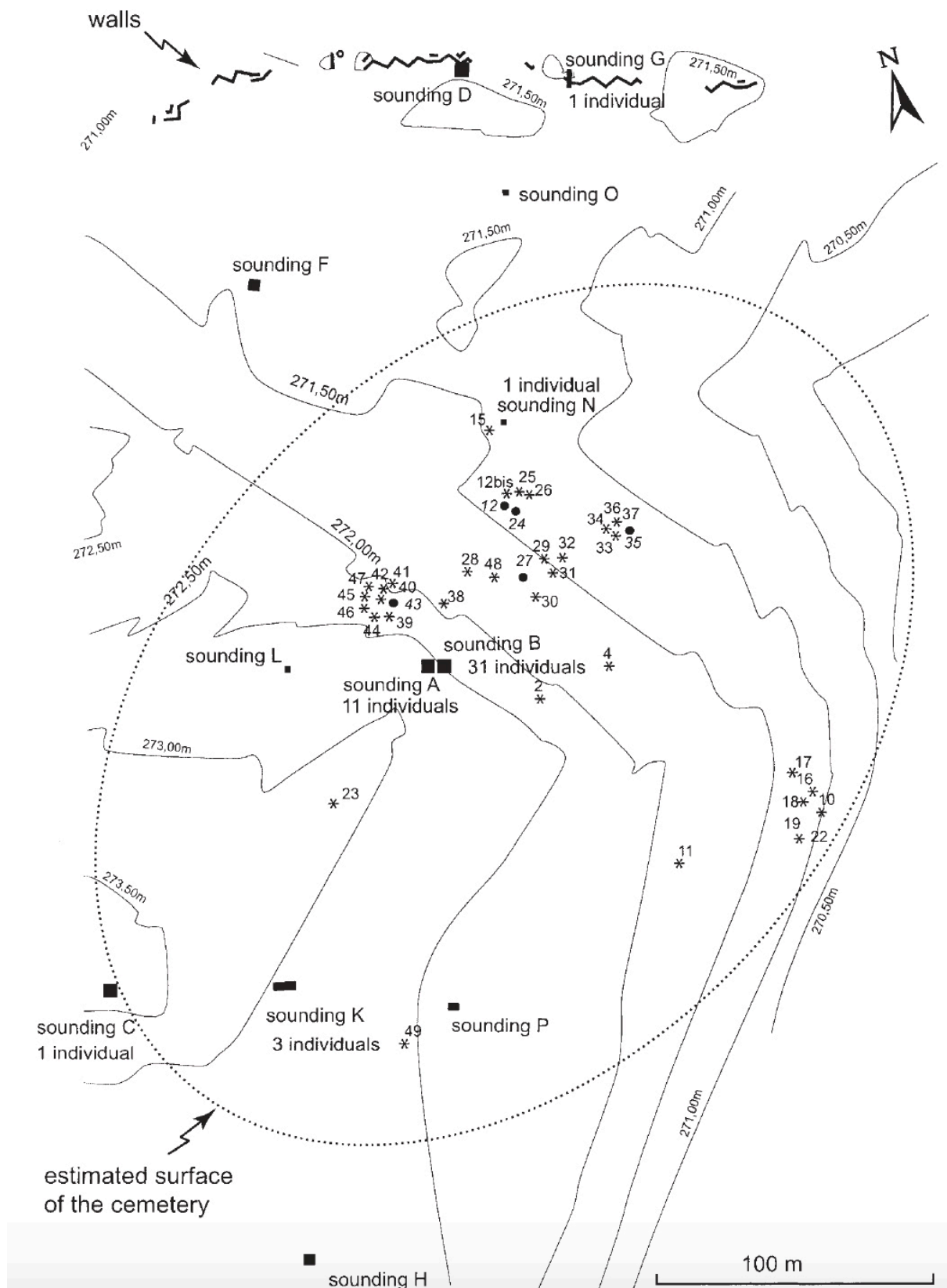


Figure 3. Map of the tombs found on surface and soundings (from the topographic map of P. Texier, modified). — tombs of ‘Islamic type’; * tombs of non ‘Islamic type’.

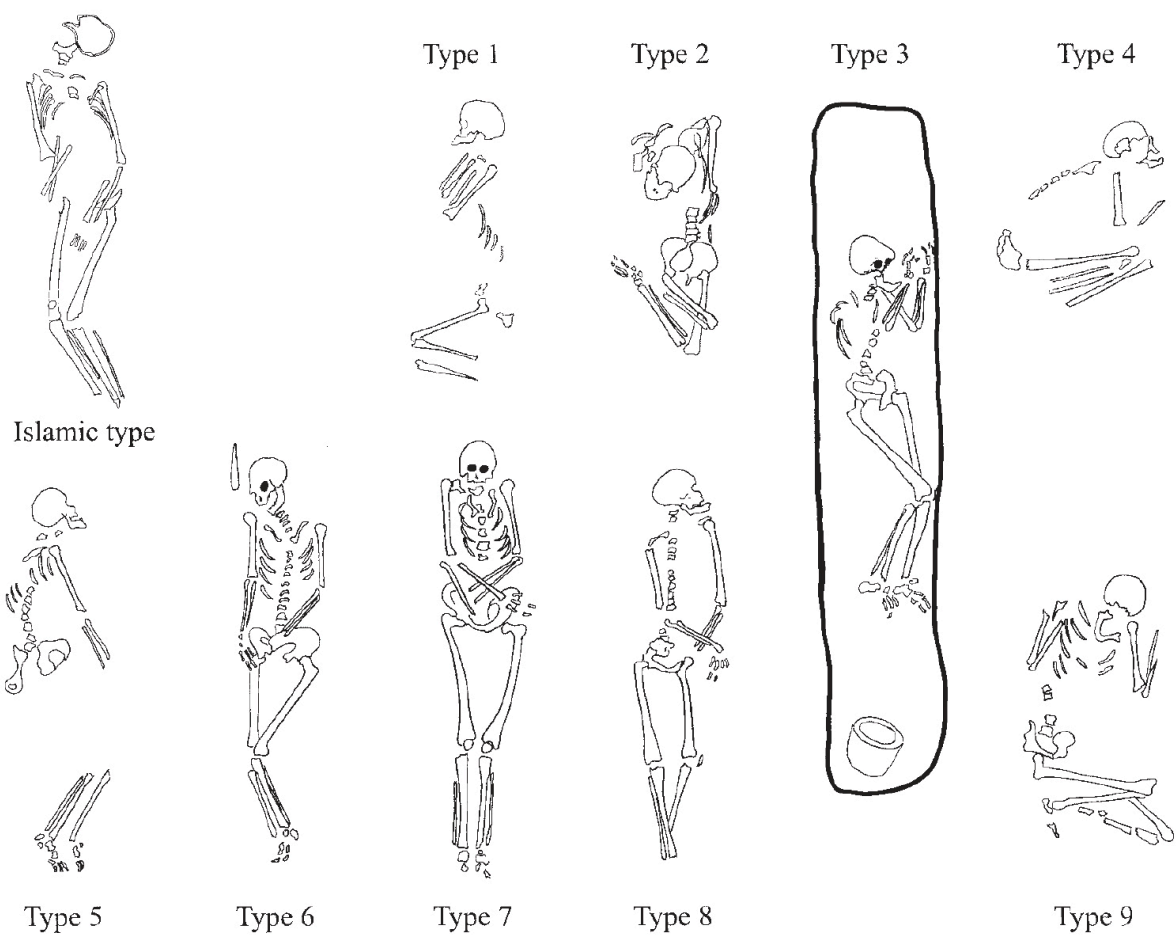


Figure 4. Different kinds of burials.

Soundings A and B (L: 5 × l: 5 × h: 3.50 m)	42 individuals, with 10 old adults, 11 adults, 4 young adults and 4 children (1 approximately 4 years old, 1 approximately 9 years old and two under 12 years old)
Sounding C	1 individual
Sounding E	4 immatures (1 approximately 8 years old, 2 of 9 years old, 1 of 15 years old)
Sounding G	1 child
Sounding K	2 adults and 1 child
Sounding N	1 adult
Surface	41 adults

Table 1. Distribution of all excavated individuals.

The recent study performed by Schmitt (2001) shows that, with the sacro-pelvic surface, the best bone indicator, adults can be classified in three large categories with a reliability of 80%: young adults (20–30 years old), middle-aged adults (30–60 years old) and older adults (60 years old). But as already mentioned, coxal bones like the whole skeletons of Dia are too badly preserved for such an attempt at categorization. Moreover, dental remains (molars) are much too incomplete to use wear pattern age at death for determination (Maat, 2001). For these reasons, we classified the adults and old adolescents into three broad categories: old adolescent- young adult, adult and old adult. We determined the sex of the adults from the morphological features of the most complete coxal bones (five males and four females), according to the method proposed by Bruzek (1991, 2002). Individual stature was calculated on long bones for only 22 adults following the method of Sjøvold (1990). Health status of the dead could be best evaluated by their teeth, which (when present) were better preserved than the bones. Normal helicoidal tooth wear is quite substantial for some individuals. For example, eight individuals exhibit completely worn tooth crown, and five individuals show alveolar resorption. Some anatomical particularities were also preserved. Two individuals have lambdatic bones and three show ossification of the styloid process and of the body of the hyoid bone. One individual possesses an occipital bun and asteriac bones, and probably died of a trepanation

on the parietal bone. The elliptical hole is about 6 cm long and extends up to the suture and cuts the groove for the superior sagittal sinus, which is a vital area. Human bones are a record of information about an individual's life. Multiplicity and redundancy of life history parameters indicate the habits of a population. Categorical differences in physical parameters can be used to recognize cultural groupings. The vertical and surface distribution of human bones in a cemetery may provide information for categorizing age, sex, trade group, family, or endogamy character of a human group within the archaeological sample. In Dia Shoma, the distribution of each osteological parameter by comparison with each other parameter does not show any specific regrouping. The anthropobiological databases are too poor to allow any differential grouping of male/female, adult/immature, or young/old adult. We found a trend concerning only the tall stature of adults, which seems to be a characteristic of the lower burials (**Figure 5**). It could be evidence for a change in population over time. We also noticed that there is an absence of immature individuals in the lower level. This could be interpreted as a natural artefact of differential preservation of more delicate juvenile bones due to the fact that they are buried less deep in soil, but the related to an individual's age (**Figure 6**) seems more convincing.

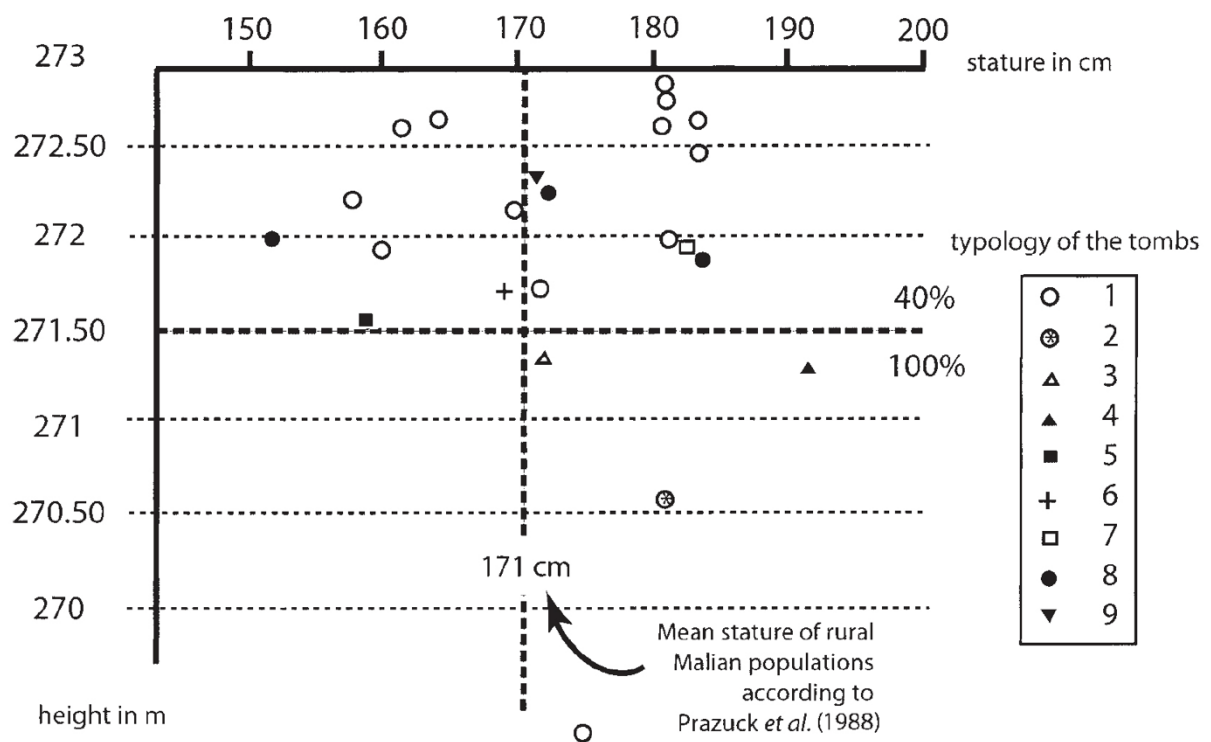


Figure 5. Stature of adults at Dia Shoma (Mali).

Field physical anthropology

The aim of archaeology and anthropology is to identify the way of life of past populations. This point is directly applied in the field: for inhumations in soil with no funerary architecture, the analysis of cadaver decomposition is the only clue for comprehending mortuary practices reflecting the society in question (Masset & Sellier, 1990; Sanogo, 1994). The methodology used to understand the mortuary practices is field physical anthropology (Ambroise & Perle's, 1972; Duday et al., 1990). Its goal is to reconstruct the original position of the body, as well as the arrangement of any pieces of clothing, ornament, shroud or other furnishings. This requires the reconstruction of the burial itself by determining whether the body was directly covered by soil, or surrounded by effective space (coffin or other architecture). Both external constraints—due to clothes, any funeral object or the shape of the burial—and internal parameters, such as the chronology of the disarticulation during decomposition, serve to demonstrate the nature of taphonomy. Indeed, the recognition of the role of both the position of the skeletal remains and the taphonomy of the cadaver offer insight into former burial practices that are relevant to cultural habits.

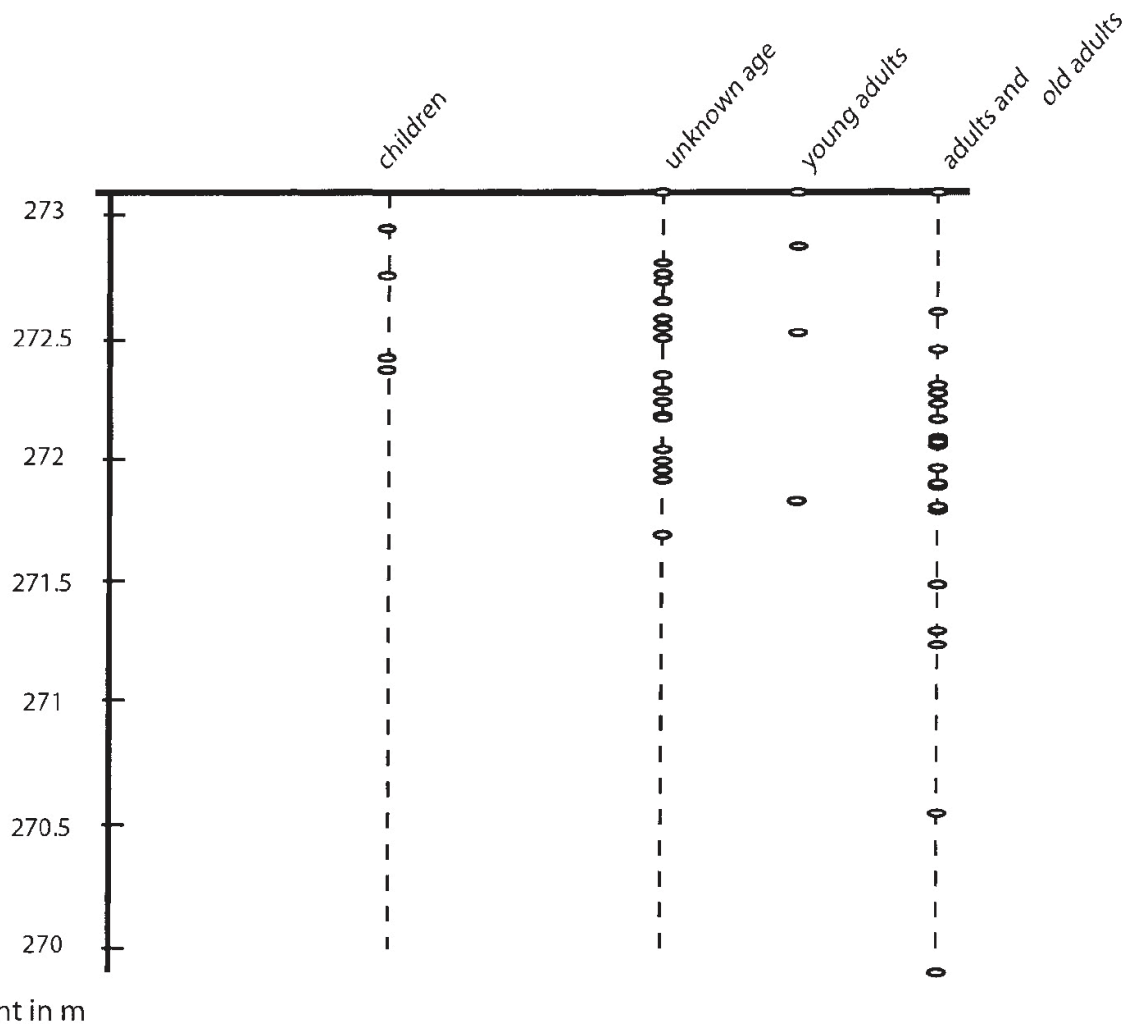


Figure 6. Distribution of individuals by age.

Different kinds of burials

Surface prospecting has shown that most adults, in single burials without any architecture, are lying on the right side, looking eastwards, with their legs in semiflexion and either both arms stretched out or one resting on the abdomen. This condition is described for Islamic-type burials (Sanogo, 1994). Only three individuals are supine with their legs in extension and one individual lies on his side, with limbs in hyperflexion. A total of ten different kinds of burials are recognized according to the analysis of field anthropology *id est*: initial position of the body, orientation and structure of the burial and material present in the tomb (**Table 2**). These categories can be interpreted as cultural markers as they exhibit intentional positioning of the cadaver in the grave. For example, the position of three of the skeletons belonging to the first category shows that, except for the head area, the flesh vanished in a space rapidly filled by sediments. The head was almost certainly placed on a funerary pillow, and the whole body was probably wrapped in a shroud. The use of a nuchal support of wood is reported for the Tellem burials (Kiethega et al., 1993) and the use of a funerary pillow is also existing among the more recent surfacial Islamic tombs of the site and is still existing today (D. Keïta, personal communication). The intersection of several graves indicates that the cemetery might have been abandoned and also eroded for a certain period of time or that no external indication of the graves existed. The intersection and the superposition of the graves allow us to describe a relative chronology. For example, we observe on the map the stratigraphic succession of graves categories (**Figure 7**): some individual graves belonging to category 8 have been found over some tombs of category 5, that were over the ones of category 7 and the deposits of category 8. It shows that category 7 succeeded to category 5, while category 8, older, pursued during and after them.

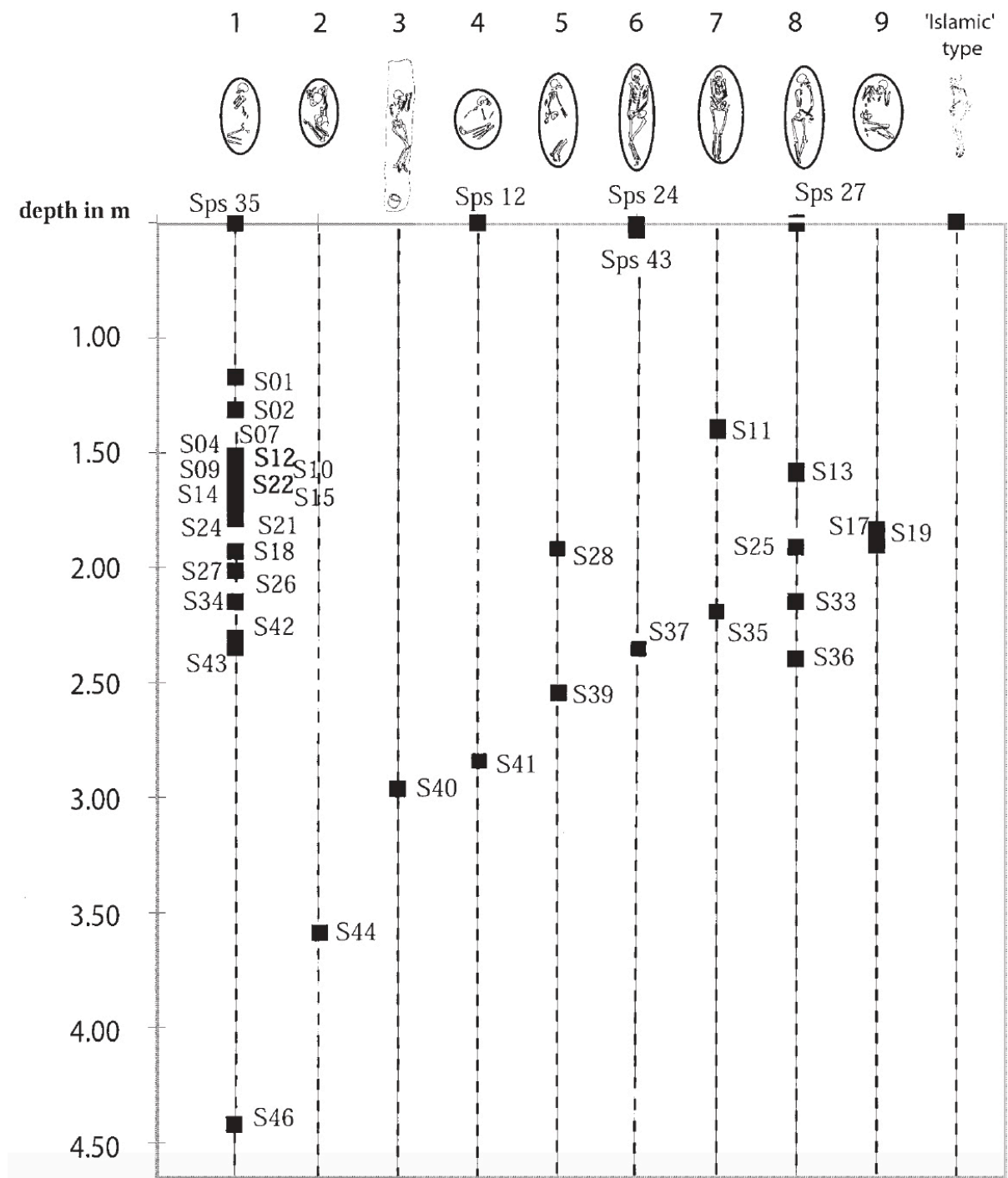


Figure 7. Distribution of the different types of burials. S.skeleton; Sps.skeleton found during surfacial survey

The dating of the material in several tombs (Bedaux et al., 2001) reveals that category 7 is older than category 2. Category 8 appearing at the same level as category 9 is, in fact, older than category 6. Both dating and relative position of the burials allow us to assess that some categories continue through time (categories 1 and 8) coexisting with categories 2, 3, 4, 6, 7 and 9 until about 1000 AD. After that period, category 5 is the only one present with categories 1 and 8. This chronological boundary is identified by archaeologists. The deposits in the other area of the site show a limit between levels III and IV (Bedaux et al., 2001). The fish remains that increase dramatically in quantity through these levels and the great amount of freshwater terrapins, Nile monitor lizards, crocodile and waterfowl suggest a considerable occupational specialization in aquatic resource exploitation when cattle also continue to increase in frequency (sheep and goat) in conjunction with antelope decline (Bedaux et al., 2001). One tomb (category 3) older than the categories 8, 7, 6 and 5 has a pot which contained ashy sediments and grains of rice. Practice of rice agriculture could be

an indication of a third specialist economic group. At least it supposes another component of subsistence. From the archaeobotanical point of view, according to S. Murray (personal communication), the boundary level III/level IV is striking in the number of changes observed in the archaeological presence of plants. African rice continued to decrease in presence compared to previous periods and other domestic grasses such as pearl millet, sorghum, and bread wheat that appeared for the first time or gained in importance.

Burial type	General position of the body	Upper limbs	Lower limbs	Number of individuals involved	Funerary particularities
Type 1	Extended on the right side (few on the left side)	Tucked up with hands on/under the face	Flexion to semiflexion	17	In some cases, the skull fell down due to the use of a funerary pillow of soft material
Type 2	Seated	Hands tied at the back	Both crossed, the right one over the left raised due to a link at the ankle	1	The body was probably buried in a vertical pit
Type 3	Extended on the left side	Hands close to the face	Semiflexion	1	A funerary jar containing rice was found in the burial pit at the feet of the skeleton
Type 4	Foetal position on the left side	Tucked up	Hyperflexion	1	
Type 5	Extended on the left side	Stretched out	Semiflexion	2	
Type 6	Extended on the back	On the abdomen	Drawn together	1	An iron harpoon has been found at the right side of the skull
Type 7	Extended on the back	Crossed on the abdomen	Drawn out	4	A wall effect on the shoulders may indicate an initial inhumation in a narrow pit or a coffin
Type 8	Extended on the back, head on its left side	Crossed on the abdomen	Crossed at the ankle	2	
Type 9	Extended on the back	Tucked up, hands at the shoulders, palms forwards	Hyperflexion, flat on the left side	2	

Table 2. The nine different types of burials recognized in Dia Shoma characterized by description of the body position, number of individuals involved and particulars associated with the tombs.

The various sepulchral categories and the changing environmental context would indicate the regional presence, at least seasonally, of specialized fishermen and herders and also agriculturists. With the limit due to the incertitude of archaeological dating, the ‘synchronicity’ of the occurrence of several kinds of burials can be seen as a cultural melting pot with two continuous kinds of tombs that exist for a long period and many other different tombs whose associations are changing through time (**Figure 8**). The relative chronology of the former typology has no universal significance and in some cases it is possible to recognize similar types of burials from older periods. Indeed, during the Lacustrine phase of the recent Holocene, funerary practices in the Sahelian part of Mali are already diverse, e.g. simple inhumations without any upper structure and others with tumuli. In Kjøkkenmodding, inhumations without protection for the body also exist from the ancient Holocene (Dutour & Petit-Maire, 1983). On other sites, except for the mortuary architecture, some positions of the skeleton (Dutour, 1983) exhibit similarities with the described tombs of Dia. Type 1 is present in the Hassi el Aboid and Tagnout Chaggeret dating from 3400 to 1900 BC. Type 4 also exists in both regions with older datings (7575–1890 BC) according to Dutour & Petit-Maire (1983). Type 8 coexists with type 4 in the region of Hassi el Aboid. In Niger, Paris (1984) described type 1 at several sites like Afunfun (Tigidit: 2880–1740 BC), Tchi Guiribe in Termit (post Neolithic), and in Aïr: Rocher Toubeau (final Neolithic), Adrar Bous (3500–2850 BC) and Iwelen (Neolithic). Type 4 coexists at the sites of Emi Lulu and Iwelen. Some types can also be recognized farther west in the collective burial ground of Tiekene Boussoura in Senegal (Thilmans et al., 1980). Thus, in a ‘megalithic circle’ dated to between 960 and 780 BC, two individuals belong to type 1, and two others to type 6 in a megalithic circle dated to around 3950 and 3800 BC. The above observations show that a regional funerary chronotypology cannot be done from the site of Dia Shoma. The main focus should be on the continuity of certain mortuary practices over a long period of time when, as in Dia Shoma, there is synchronicity (archaeologically speaking) of several funerary practices. This latter fact is, in accordance with bioanthropological data, archaeological evidence of cultural diversity and could be linked to migration in the inner Niger delta. Over the occurrence of a cultural melting pot, the change in the association of different types of tombs in relation to relative chronology and dating in Dia Shoma through time also gives this insight into historical events. Yet, before the stratigraphic limit: level III/level IV id est 1000 AD, there are several kinds of tombs: categories 1, 2, 3, 4, 6 and 7 coexisting with category 8. Afterwards, the burial assemblage is 1, 5 and 8. It is relevant to note that it occurred during the decline of the Empire of Ghana (Dembélé, 1991) when the Almoravides occupied the northern towns of the former Empire. The regional political change might have disturbed commercial activities and roads to Dia as this town is located on the border of the Empire. The northern part of the lost Empire developed nomadism while its southern part became the domain of agriculturists. The large number of deposits and archaeological remains from 1000 to 1600AD in Dia shows a wide range of human activity and settlement near the cemetery (Bedaux et al., 2001). As indicated by funerary practices, when the political and religious power changed, it took time for common people to change their way of life. Categories 1 and 8 remained in use whereas Islamic burial appeared later.

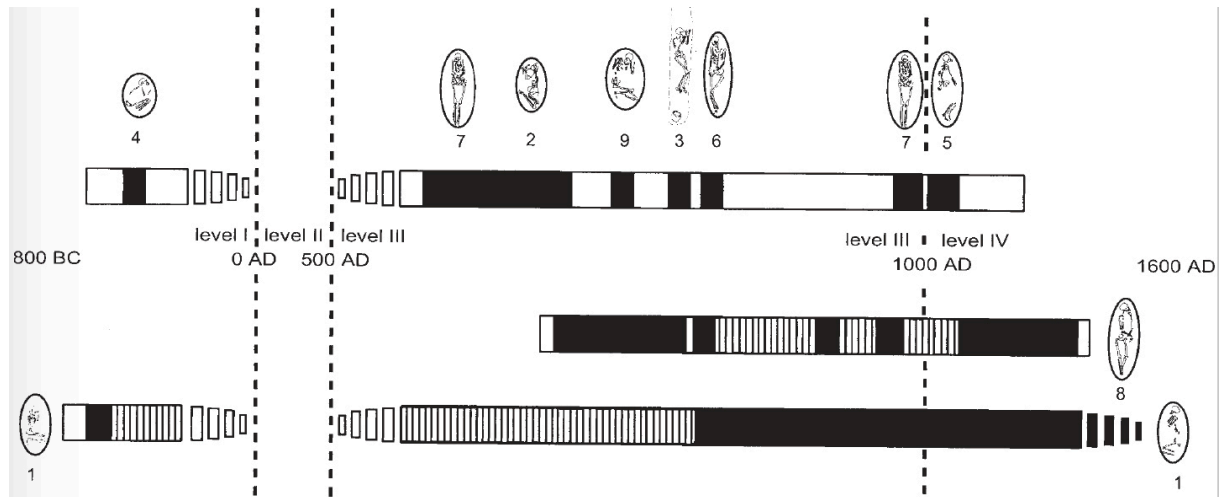


Figure 8. Change in the association of the funerary practices.

Conclusion

The inner Niger delta is of particular interest for the understanding of population way of life and migrations in the Western Saharan area. Considering archaeological resources from an anthropological point of view provides information about human settlement in this region. The work conducted in the medieval cemetery of Dia Shoma is consistent with this perspective. The buried population of Dia is characterized both by its morphometrical features and mainly associated funeral practices. Those parameters combined with archaeological data provide information about cultural affiliation and habits. Even if few data have been obtained due to generally poor preservation of the bones, ten different types of tombs have been categorized. The literature reveals that these burial types were present in western Africa but fails to provide information on their absolute temporal distribution. Nevertheless, the relative chronology at the site of Dia Shoma and the dating of its archaeological material provide information that suggests coexistence of several communities. This melting pot mainly recorded through funerary practices has changed with time due to historical events. On the one hand, the change among funerary practices can be related to the coexistence of several communities in the same territory using its different natural resources. On the other hand, the change in the association of tombs through time could reflect economical changes after the occupation of the northern part of the Empire by the Almoravides. After this event, the rich association of inhumations with seven different kinds of burials became poorer showing a reduction of economic exchange after the fall of the Empire of Ghana. The increase of domestic grasses (pearl millet, sorghum, wheat), other than rice, contemporary to the introduction of goat and sheep suggests either a new kind of economical pattern, or a new management of the environment after 1000 AD. At this moment, the contribution of herders, fishermen and or agriculturists may have changed. But, it does not exclude that, for the following period and before the effective Islamization of the local population, the migration may have decreased. It is important to note that the change of the politicalreligious power could be a little diachronic between the central settlement and external area of the lost Empire of Ghana. Further work should be done on that topic to determine when effective Islamization can be assessed by archaeological evidence in different regions of the Empire.

Acknowledgements

We wish to express our thanks to all the students, the field specialists, the local excavation team and the people of Dia. We would like to thank especially for their contributions the following persons: A. Person, J. Polet, R. Bedaux, K. Sanogo, J. F. Saliège, P. Texier, N. Arazi, D. Keïta and the director of the fieldwork A. Schmidt. The Dia archaeological Project was initiated by the Rijksmuseum voor Volkenkunde at Leiden in close co-operation with the Université du Mali, the Institut des Sciences Humaines and the Musée National du Mali in Bamako, the Mission Culturelle in Djenné, the University of Paris I, the University of Paris VI, the C.N.R.S., University College London and Leiden University. For their financial support, we are indebted to the Dutch and French Ministries of Foreign Affairs, the Laboratoire de Recherche en Afrique (UMR 7041 du CNRS, Paris) and the University College London. Thanks to L. Garenne-Marot,

the Laboratoire de Recherche en Afrique, M.R. Meyer, University of Pennsylvania, M. Featherston, A. Schmitt, University of Bordeaux I, F. L'Engle Williams and two anonymous reviewers for their helpful comments.

References

- Ambroise D, Perlès C. 1972. Etude de la position des ossements d'un squelette néolithique (Sépulture collective de la Chaussée-Tirancourt, Somme). *L'Anthropologie* 76: 535–544.
- Bedaux R, Constandse-Westermann T, Hacquebord L, Lange A, van der Waals J. 1978. Recherches archéologiques dans le delta intérieur du Niger (Mali). *Palaeohistoria* 20: 91–220.
- Bedaux R, Mac Donald K, Person A, Polet J, Sanogo K, Schmidt A, Sidibé S. 2001. The Dia archaeological project: rescuing cultural heritage in the Inland Niger Delta (Mali). *Antiquity* 75: 837–848.
- Bruzek J. 1991. Fiabilité des procédés de détermination du sexe à partir de l'os coxal. Implications à l'étude du dimorphisme sexuel de l'homme fossile. Unpublished Ph.D. thesis. Muséum National d'Histoire Naturelle, I.P.H., Paris.
- Bruzek J. 2002. A Method for visual Determination of Sex, Using the Human Hip Bone. *American Journal of Physical Anthropology* 117: 157–168.
- Dembélé M. 1991. Histoire et tradition orale. In *Recherches Archéologiques au Mali. Les Sites Protohistoriques de la Zone Lacustre*, Raimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 229–247.
- Dembélé M, Raimbault M. 1991. Les grandes buttes anthropiques. In *Recherches archéologiques au Mali. Les sites protohistoriques de la zone lacustre*, Raimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 249–271.
- Duday H, Courtaud P, Crubézy E, Sellier P, Tillier AM. 1990. L'anthropologie 'de terrain': reconnaissance et interprétation des gestes funéraires. *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 2: 29–50.
- Dutour O. 1983. Hommes Fossiles du Sahara. *Peuplements Holocènes du Mali Septentrional*. Editions du CNRS: Paris.
- Dutour O, Petit-Maire N. 1983. Sépultures et restes osseux. In *Sahara ou Sahel? Quaternaire récent du bassin de Taoudenni (Mali)*, Petit-Maire N, Riser J (eds). CNRS: Marseille; 277–306.
- Flight C. 1975. Gao, 1972: first interim report: a preliminary investigation of the cemetery at Sané. *West African Journal of Archaeology* 5: 81–90.
- Fontes PB. 1991. Sites archéologiques de la région des lacs au Mali: éléments chronologiques. In *Recherches archéologiques au Mali. Les sites protohistoriques de la zone lacustre*, Raimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 259–271.
- Fontes PB, Person A, Saliège JF. 1991. Prospection des sites archéologiques de la région des lacs et du delta intérieur du Niger (1980). In *Recherches archéologiques au Mali. Les sites protohistoriques de la zone lacustre*, Raimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 27–61.
- Insoll TA. 1996. Settlement and trade in Gao, Mali. In *Aspects of African Archaeology*, Pwiti G, Soper R (eds). *Papers from the 10th Congress of the Pan African Association for Prehistory and Related Studies*. University of Zimbabwe: Harare; 662–669.
- Kiethega JB, Sidibé S, Bedaux R. 1993. Les pratiques funéraires. In *Vallées du Niger, Réunion des Musées Nationaux*: Paris; 425–440.
- Maat G. 2001. Diet and age-at-death determination from molar attrition a review related to the low countries. *Journal of Forensic Odontostomatology* 19: 18–21.
- Masset C, Sellier P. 1990. Les anthropologues, les morts et les vivants. *Les Nouvelles de l'Archéologie* 40: 5–8.
- Mauny R. 1951. Notes d'archéologie au sujet de Gao. *Bulletin de l'I.F.A.N.* 230: 368–376.
- Mauny R. 1961. Catalogue des restes osseux humains préhistoriques trouvés dans l'ouest africain. *Bulletin de l'I.F.A.N.* 23(3–4): 388–410.
- Paris F. 1984. La région d'In Gall-Tegidda N Tesemt (Niger). Programme archéologique d'urgence 1977–1981. Les sépultures du Néolithique final à l'Islamisation. Institut de Recherches en Sciences Humaines: Niamey.
- Person A, Saliège JF, Balter V, Labourdette N, Zeitoun V, Schmidt A, Polet J. In press. Datation, diagenèse et conservation des signaux biogéochimiques des ossements archéologiques de la nécropole de Dia Shoma: Applications environnementales et culturelles. Actes du 11^{ème} Congrès de l'Association Panafricaine de Préhistoire et Disciplines Assimilées (Bamako).
- Prazuck T, Fisch A, Pichard E, Sidibé Y. 1988. Lack of secular change in male adult stature in rural Mali (West Africa). *American Journal of Physical Anthropology* 5: 471–475.
- Raimbault M. 1991. La fouille sur la butte de Toubel (GMB 1) mission de 1987, rapport préliminaire. In *Recherches archéologiques au Mali. Les sites protohistoriques de la zone lacustre*, Raimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 390–412.
- Raimbault M, Sanogo K. 1991. *Recherches archéologiques au Mali. Les sites protohistoriques de la zone lacustre*. Karthala et ACCT: Paris.
- Saliège JF, Person A, Barry I, Fontes P. 1980. Premières datations de tumulus pré-islamiques au Mali: site mégalithique de Tondidarou. *Comptes Rendus de l'Académie des Sciences, Paris* 291: 981–984.
- Sanogo K. 1994. Les modes d'inhumation dans la boucle du Niger. In *Boucle du Niger: approches multidisciplinaires*

- Kawada (ed.). Institut de Recherches sur les langues et Cultures d'Asie et d'Afrique: Tokyo; 2: 211–258.
- Schmitt A. 2001. Variabilité de la sénescence du squelette humain. Réflexion sur les indicateurs de l'âge au décès à la recherche d'un outil performant, Thèse de doctorat en anthropologie, Université Bordeaux I.
- Sidibé S. 1980. Archéologie funéraire de l'Ouest africain: sépultures et rites. Unpublished Ph.D. thesis, Université de Paris I.
- Sidibé S, Rimbault M. 1991. Les sondages dans la butte de Kawinza I (KWZ I) campagne de 1984. In Recherches archéologiques au Mali. Les sites protohistoriques de la zone lacustre, Rimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 273–280.
- Sjøvold T. 1990. Estimation of the stature from long bones utilizing the line of organic correlation. *Journal of Human Evolution* 5: 431–447.
- Szumowski G. 1957. Fouilles au nord du Macina et dans la région de Ségou. *Bulletin de l'I.F.A.N.* 224-258.
- Thilmans G, Descamps C, Khayat B. 1980. Protohistoire du Sénégal. Mémoires de l'Institut Fondamental d'Afrique noire n-91, T. 1, les sites mégalithiques. IFAN, Dakar.
- Togola T, Rimbault M. 1991. Les missions d'inventaire dans le Méma, Karéri et Farimaké (1984–85). In Recherches archéologiques au Mali. Les sites Protohistoriques de la Zone Lacustre, Rimbault M, Sanogo K (eds). Karthala & ACCT: Paris; 81–98.
- Ubelaker DH. 1984. *Human Skeletal Remains. Excavation, Analysis, Interpretation* (revised edition). Taraxacum: Washington, DC.