

Nicole Rupp, Christina Beck, Gabriele Franke
& Karl Peter Wendt (eds.)

Winds of Change

Archaeological Contributions
in Honour of Peter Breunig

Nicole Rupp / Christina Beck / Gabriele Franke / Karl Peter Wendt (eds.) ·
Winds of Change



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Hans-Markus von Kaenel, Rüdiger Krause, Jan-Waalke Meyer und Wulf Raeck

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Preface

This Festschrift is dedicated to our mentor, teacher and highly regarded colleague and friend Peter Breunig on the occasion of his 65th birthday. It is published in the monograph series *Frankfurter Archäologische Schriften* and includes personal appreciations and 33 contributions from his former students, colleagues, long-time companions and friends. The title *Winds of Change* follows a journey through his career, reflecting both the diversity of his research and the periods in West African prehistory that have for a long time been the central focus of his research. Profound transitions in economic systems, subsistence and technologies and their effects on prehistoric societies and the environment have been Peter Breunig's main interests, with which he has entered new archaeological and challenging territories more than once in both West Africa and Namibia.

The number of people who accepted our invitation to contribute to this volume has exceeded our expectations, which is a testament to the positive impression that Peter Breunig has made not only on the Africanist research community, but also as an academic teacher and head of the Department of African Archaeology and Archaeobotany at the Goethe University's Institute for Archaeological Sciences in Frankfurt am Main.

His multiple interests are reflected by the wide range of themes covered in this book. This volume comprises scientific papers on various archaeological and archaeobotanical topics, such as rock art and prehistoric settlement and subsistence strategies, as well as theoretical and methodological aspects of archaeological research and travel accounts in both prose and verse. Geographically, the main focus is on sub-Saharan Africa, but contributions also extend to Germany and even to China. We have structured the book around Peter Breunig's academic career starting with colleagues and friends from his early years at the University of Cologne, followed by his research in the Nigerian Chad Basin and other parts of the West African savanna, and his research on the Nok Culture of central Nigeria. His interests beyond the West African savanna are reflected in the final chapter. Interspersed throughout are expressions of appreciation, his publications and supervised theses, greetings from Nigerian team members, and the commemoration of Nigerian team members who have passed away.

We as editors decided against a peer-review format, opening the way for more personal accounts of the life and personality of Peter Breunig. We did most of the editorial work ourselves, supported by the contributors, Gabriele Försterling and Monika Heckner who made graphical improvements and designed the cover design, Eyub F. Eyub who worked on the maps, Peter Dahm Robertson and Kathleen Loftus who assisted with translations, and Dr. Susanne Biegert from Habelt Verlag. Our sincere thanks go to everybody who accompanied us on our exciting journey to the printed book – the authors for their contributions, the editors of the *Frankfurter Archäologische Schriften* series for offering us an attractive publication platform, our financial sponsors without whom this book could not have been printed, our colleagues for their support and comments, and the people at Habelt Verlag who actively supported us from the very beginning of this project.

We sincerely hope that our mentor Peter Breunig and the hopefully numerous readers will enjoy reading this volume's impressive personal and scientific contributions as much as we have done in the last 18 months. May the words of Bob Dylan accompany Peter, whatever the *Winds of Change* will bring.

*May you have a strong foundation
When the winds of changes shift
May your heart always be joyful
And may your song always be sung
May you stay forever young*

Nicole Rupp, Christina Beck, Gabriele Franke & Karl Peter Wendt

Vorwort

Für die Herausgeber der Frankfurter Archäologischen Schriften bedeutet es eine sehr große Freude, der Festschrift für Peter Breunig den editorischen Rahmen zu bieten. Seit Jahrzehnten verbinden uns gelebte Kollegialität und Freundschaft im Rahmen des Instituts für Archäologische Wissenschaften. Als Peter Breunig 1992 nach Frankfurt a. M. berufen wurde, waren die archäologischen Fächer an der Goethe-Universität noch auf drei Einheiten und zwei verschiedene Fachbereiche verteilt. Peter Breunig hat in der Folge wesentlichen Anteil daran gehabt, dass die Frankfurter Archäologien zu einem großen und leistungsstarken Institut zusammengewachsen sind. Für dessen erfolgreiche Entwicklung mit gewichtigen Forschungsvorhaben und strukturierten Programmen hat Peter Breunig viele Impulse gegeben und immer wieder Maßstäbe gesetzt. Seine Kompetenz und Erfahrung, die er in einer langen Reihe von durch die Deutsche Forschungsgemeinschaft unterstützten Projekten in leitenden Funktionen gesammelt hat, brachte er immer wieder zum Wohle des Instituts ein.

Durch seine Lehrveranstaltungen und die langjährigen archäologischen Feldforschungen in Burkina Faso, Namibia und Nigeria hat Peter Breunig Generationen von Frankfurter Studierenden und wissenschaftlichen Mitarbeitern geprägt, ihnen die Augen für die Archäologie und die Geschichte Afrikas geöffnet und die Potenziale aufgezeigt, die in einer modernen interdisziplinären Herangehensweise liegen. Peter Breunig lebt vor, was Internationalität bedeutet. Nach Kräften fördert er den gegenseitigen Austausch von Lehrenden und Studierenden mit Partnerinstitutionen in verschiedenen Ländern Afrikas. Das von ihm ins Leben gerufene und zusammen mit Sonja Magnavita herausgegebene *Journal of African Archaeology* hat sich zu einer heute nicht mehr wegzudenkenden internationalen Plattform für die archäologische Forschung in Afrika entwickelt. Zu einer anerkannten Institution geworden ist ebenso die zum Team Peter Breunigs gehörende Arbeitsstelle zur Archäobotanik und Vegetationsgeschichte Afrikas, die unter Leitung von Katharina Neumann steht.

Wir sind stolz auf das, was unser Kollege Peter Breunig in Frankfurt a. M. aufbauen und sehr erfolgreich in die internationale Afrika-Archäologie einbringen konnte. Wir gratulieren ihm sehr herzlich zu seinem Geburtstag und wünschen ihm auch in Zukunft bestes Gelingen in seiner unermüdlichen Tätigkeit zum Wohle der Archäologie Afrikas.

Hans-Markus von Kaenel, Rüdiger Krause, Jan-Waalke Meyer & Wulf Raeck
Herausgeber der Frankfurter Archäologische Schriften

Grußwort

Die Nachricht, die da am Morgen des 23. Februar 2017 über die Agenturen kam, schockierte: Zwei deutsche Archäologen in Nigeria entführt! – Professor Peter Breunig und sein Doktorand Johannes Behringer waren aus ihrer Ausgrabung heraus von schwer bewaffneten Kriminellen verschleppt worden. Glücklicherweise kamen beide Wissenschaftler wenige Tage später wohlbehalten frei. Dieses schlimme Ereignis machte aber wieder einmal deutlich, unter welchen schwierigen Bedingungen archäologische Feldforschung in vielen Teilen Afrikas stattfindet.

Peter Breunig gehört zu den renommiertesten internationalen Afrika-Archäologen und ist in verschiedenen Ländern dieses faszinierenden Kontinents seit Jahrzehnten forschend tätig. Er zählt ohne Frage zu den Pionieren moderner archäologischer Feldforschung im subsaharischen Afrika. Beschäftigte er sich in seiner 1989 erfolgten Promotion in Fragen der ¹⁴C-Chronologie des vorderasiatischen, südost- und mitteleuropäischen Neolithikums, setzte er sich in der dann folgenden Habilitation mit dem Brandberg, einem ariden Hochgebirge am Rand der Namib-Wüste in Namibia und seiner Besiedlungsgeschichte auseinander. Eingebettet waren diese Arbeiten in die Felsbildforschungen des Heinrich-Barth-Instituts der Universität zu Köln, ein Forschungsvorhaben, das bereits seit 1983 über viele Jahre von der Deutschen Forschungsgemeinschaft (DFG) gefördert wurde und Köln zu einem international weit sichtbaren Ort für diese Forschungen machte. Wie sehr Peter Breunig diese Thematik wie auch Namibia, seine Geschichte, aber auch seine Menschen und Kultur am Herzen liegen, zeigt sich darin, dass er 2014 einen umfangreichen archäologischen Reiseführer über Namibia veröffentlichte.

Kontakt zu den Menschen der von ihm beforschten Gastländer aufzubauen, sie an seinen Forschungen teilhaben zu lassen, wie auch der Wunsch, in seinem Heimatland einer breiten Öffentlichkeit über die Arbeiten zu berichten, prägen sein weiteres akademisches Wirken. 1992 erhielt Peter Breunig einen Ruf auf die Professur für Vor- und Frühgeschichte Afrikas an die Goethe-Universität in Frankfurt am Main. Hier intensivierte er seine wissenschaftlichen Afrikaforschungen und wurde von 1998 bis 2002 Sprecher des dort seit 1989 laufenden Sonderforschungsbereichs 268 „Kulturentwicklung und Sprachgeschichte im Naturraum der westafrikanischen Savanne“. Der Beforschung kultureller Umbrüche und Innovationen in ökologischen Übergangszonen des subsaharischen Afrika galt sein wissenschaftliches Interesse. Aus den Arbeiten im Sonderforschungsbereich heraus erwuchs dann das Thema einer von ihm von 2003 an geleiteten DFG-Forschergruppe, die sich über sechs Jahre mit dem ökologischen Wandel und kulturellen Umbrüchen in West- und Zentralafrika im ersten vorchristlichen Jahrtausend befasste, wobei ein wichtiger regionaler Schwerpunkt im Tschadbecken von Nordost-Nigeria lag.

Diese Tätigkeit schuf schließlich die Basis für ein weiteres durch die DFG gefördertes Projekt, nämlich die Erforschung der Nok-Kultur in Nigeria. Im Rahmen des 2009 bewilligten Langfristvorhabens widmet sich Peter Breunig nun zusammen mit Katharina Neumann, die den archäobotanischen Projektteil leitet, Fragen der Entstehung dieser früheisenzeitlichen Kultur, zu deren herausragenden kulturellen Errungenschaften kunstvoll gearbeitete, teilweise lebensgroße menschen- und tiergestaltige Terrakotta-Plastiken gehören. Einen hervorragenden Einblick in diese spannenden Forschungsarbeiten bot die Frankfurter Liebieghaus Skulpturensammlung 2014 mit der von Peter Breunig und seinem Team maßgeblich mitkonzipierten Ausstellung „Nok – Ein Ursprung afrikanischer Skulptur“. Hier eröffnete sich der interessierten Öffentlichkeit die Möglichkeit, einzutauchen in diese faszinierende und für uns doch fremde Welt einer über 2000 Jahre alten, frühbäuerlichen Kultur, wie sie am Rande des westafrikanischen Regenwaldes existierte. Dass diese Ausstellung in Deutschland gezeigt werden konnte, war keine Selbstverständlichkeit, denn die Terrakotta-Skulpturen sind aufgrund ihres großen kulturellen Wertes erklärtes Ziel von Raubgräbern und erzielen im illegalen Antikenhandel hohe Preise. So bedurfte es eines

ausgesprochen guten und tiefen Vertrauensverhältnisses zu den nigerianischen Behörden, um die notwendige temporäre Ausfuhrgenehmigung für diese Objekte zu erhalten.

Die wissenschaftlichen Arbeiten zur Nok-Kultur werden voraussichtlich noch einige Jahre weitergehen. Es bleibt zu hoffen, dass die politischen Entwicklungen und Rahmenbedingungen, die in Nigeria nicht vorherzusehen sind, Peter Breunig und seinem Team die Weiterarbeit auch vor Ort erlauben, wo er inzwischen eine kleine Forschungsstation errichtet hat. Und es ist ihm zu wünschen, dass die über Jahrzehnte aufgebauten Beziehungen zu den Menschen dieser Region fortbestehen. Denn wer Peter Breunig kennt, der weiß, dass es ihm ein Herzensanliegen ist, seine Forschungen auch immer in enger Verbindung mit den Menschen Afrikas zu bringen. Mögen noch viele ertragreiche Schaffensjahre vor ihm liegen.

Hans-Dieter Bienert

Deutsche Forschungsgemeinschaft, Siegburg/Bonn

Grußwort

The antiquity and longevity of the Nok Culture of Central Nigeria (1500-0 BCE) make it an indelible part of any history of the continent's artistic heritage. It is well known for its terracotta figurines and represents some of the earliest dates for iron smelting in West Africa. Yet its significance has been recognised only sporadically through research, collecting and exhibitions. Perhaps this neglect is due to their pervasiveness in both domestic and ritual spheres but definitely the major motivation to unravel this enigma through a joint research project between the National Commission for Museums and Monuments and the Goethe University Frankfurt with Professor Peter Breunig as the driving force.

The hypothesis of the project which commenced in 2005 was that the evolved style of Nok terracotta art and the early iron smelting emerged from a complex society. However, this theoretical foundation has changed based on the results achieved by studying various aspects of the Nok Culture including settlement patterns, iron-smelting technology, geochemical investigation, and archaeobotanical investigation on subsistence and vegetation.

About 350 sites have been documented with around 80 excavated so far. This project has helped to create an interactive opportunity with indigenes of the area, other Nigerians and the international community on the significance of the Nok Culture to African history and civilisation.

While the success of this project cannot be attributed solely to the leadership of Professor Breunig, his personal charm and patience have been very inspiring to all members of the team and the participating institutions.

It should be recalled that Professor Breunig's work in the Lake Chad region also led to the discovery of the oldest boat from Africa, the Dufuna canoe.

The National Commission for Museums and Monuments is therefore very proud to be associated with Professor Breunig for his contribution to the reconstruction of African history in general and documentation on Nigeria's heritage in particular.

We express our deepest gratitude to Professor Breunig for extraordinary effort.

Yusuf Abdallah Usman

National Commission for Museums and Monuments, Abuja

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Greetings from Nigeria

In Memoriam

Windé Koroji Ouest (Mali, Third and Second Millennia BCE): The Environmental and Subsistence Evidence

Kevin MacDonald, Louis Champion & Katie Manning

Windé Koroji Ouest is an early agro-pastoral site situated at the eastern periphery of the Inland Niger Delta of Mali, north of the Gandamia and Bandiagara escarpments. This chapter is the first publication of all subsistence and environmental information available concerning this site which was excavated by the senior author in 1992/1993. The presence of domestic millet ca. 2100-1900 BCE is confirmed, as well as sheep during this same period, with cattle attested subsequently (post 1600 BCE). The role of the environment and potential environmental change in the economy of this site is reviewed. It is argued that Windé Koroji Ouest existed within wider, seasonally mobile settlement networks exhibiting a range of flexible subsistence adaptations.

KEY WORDS: Early agriculture, domestic millet, domestic livestock, Ceramic Late Stone Age, Mali

Introduction

In winter 1992/93, as part of the senior author's doctoral field research, a group of Ceramic Late Stone Age sites were found clustered around a dried-up stream bed in a pasture area called "Windé Koroji" (Fulbe for "where the cattle go without water"). Two of these five sites, Windé Koroji Ouest and Sud Ouest, were test excavated, some data was included in MACDONALD'S (1994) Cambridge PhD, and an initial report on the "Windé Koroji Complex" was subsequently published (MACDONALD 1996). This work concentrated mainly on survey results as analysis of data from the excavations was incomplete. In the wake of other excavation and survey projects and the beginnings of an academic career, the final analysis of Windé Koroji Ouest (WKO) was laid to one side. However, the fact that domestic millet was identified from flotation samples from WKO (and presented in conference papers by Capezza and MacDonald), and that sheep and cattle were recorded in the faunal remains (MACDONALD & MACDONALD 2000), kept this second millennium site as an important – if incompletely justified – data point in the spread of West African agriculture (*cf.* BREUNIG & NEUMANN 2002; MARSHALL & HILDEBRAND 2002; NEUMANN 2005; MANNING 2010). The present contribution – offered as a fond homage to Prof. Peter Breunig for whom the site has been of synthetic interest – seeks to at last provide a full report on subsistence data from WKO, which has remained vexatious by its absence.

Windé Koroji is situated at the eastern edge of the Inland Niger Delta's ancient floodplain, at the north-western tip of the towering (>500 m) Gandamia (*aka* Dyoundé) escarpment and some 12 km north of the nearest substantial town, Douentza (Fig. 1). It falls within a region termed the "Gourma des Monts" – a western margin of the greater Sahelian Gourma region which fills the area south of the Niger Bend. Since the colonial era this semi-arid desert scrub landscape has been a Peulh pastoral area with an annual rainfall in the order of 421 to 508 mm between the 1920s and 1970s (GALLAIS 1975).

The site of Windé Koroji Ouest was selected for test excavation as it had the densest scatter of surface artefacts of any of the sites recorded in this pasture area. The site is on a raised islet within a minor fossil drainage which empties into a larger east-west palaeochannel (Fig. 2). Scatter at the site covers seven hectares of ground, lying SW to NE, and is bisected by an alignment of five stone tumuli. The northernmost tumuli extend into a low lying area beside the main site, indicating that they may have been built after the area was no longer subject to annual inundation.

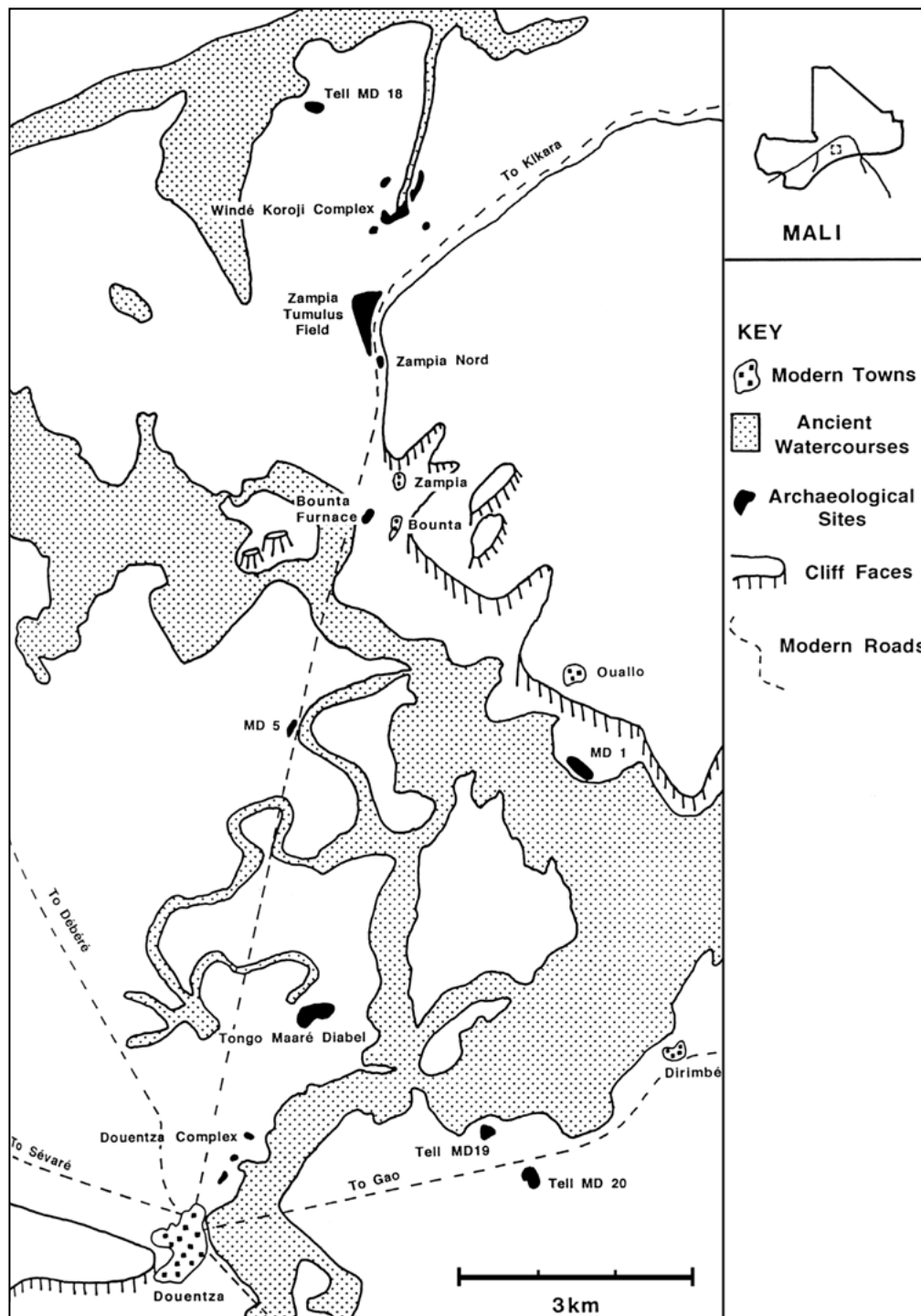


Fig. 1. Map of the 1992-1993 Douentza Survey area, based on IGN aerial photographs, showing the relation of principal archaeological sites to land forms.

Two 2 x 2 m test excavations were opened in the highest area of the scatter (WKO-I and WKO-II) and a pie-quarter of Tumulus 5 was also excavated. The results of these excavations may be summarised as follows:

- WKO-I encountered a midden overlying a well-preserved round pit-house cut into the local clay and featuring a hearth. These features provided rich faunal and macrobotanical samples and two radiocarbon dates (see next section).
- WKO-II featured only the lower half of the extended inhumation of a mature female, with one leg crossed over the other. Finds from above this inhumation include a group of quartz and carnelian biconically-perforated

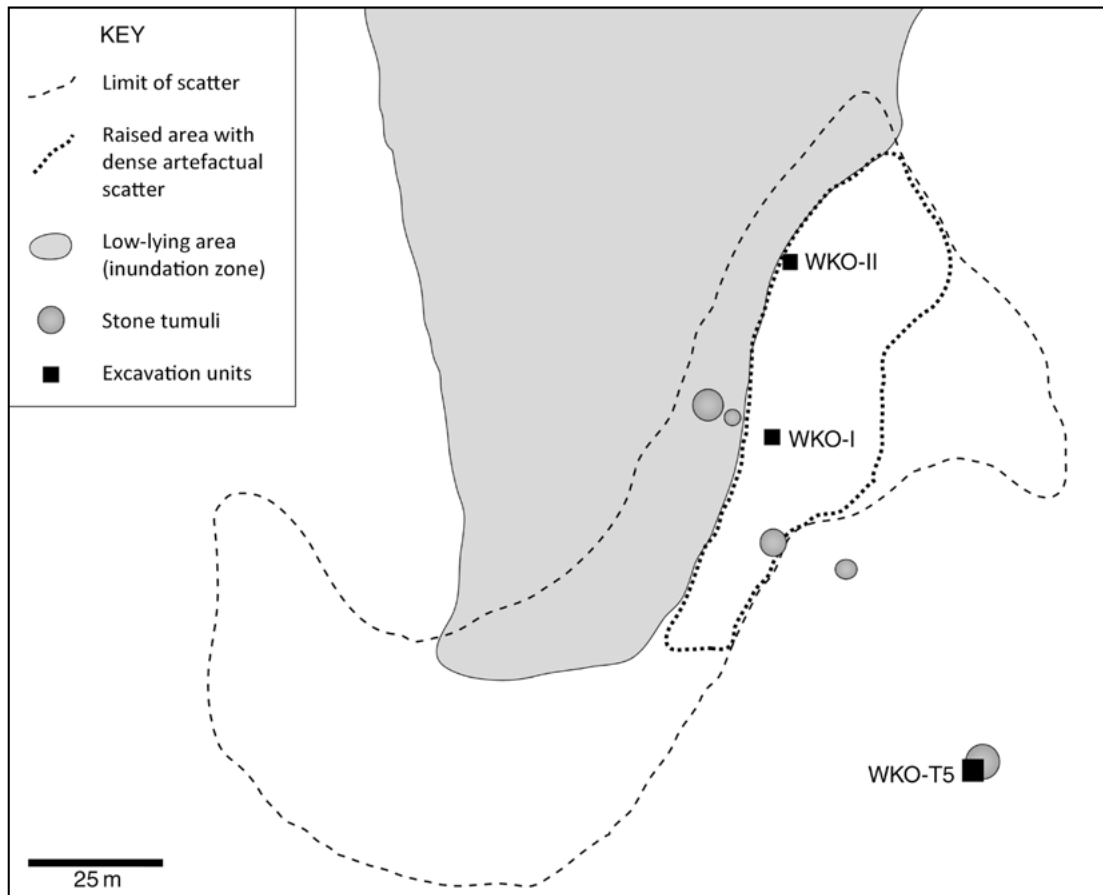


Fig. 2. Plan of Windé Koroji Ouest based on a topographic survey of the site undertaken in 1993.

beads and two polished stone hachettes which may have served as grave goods, but were not in direct contact with the inhumation. The superior portion of the body would have been oriented to the SSW.

- WKO Tumulus 5, although not directly dated, corresponds in artefactual content and form to the nearby “pseudotumuli” of Zampia which were dated to the first millennium BCE (MACDONALD 1998). This tumulus has a diameter of 5.5 m and rises 0.5 m above the plain. Excavation of the SW quadrant of the tumulus recovered 0.85 m³ of rough sandstone, 2 “intact” pots (with bottoms broken out), fragments of 42 additional vessels, one grooved and one ungrooved sandstone pilon, two broken grinding platforms, 18 upper grindstones, a terracotta bottleneck, and – at the centre of the tumulus – a sandstone hammer or “phallus”. No human or animal remains were encountered. The ceramics differ significantly from those found in the other WKO units and at other related Windé Koroji occupation sites. Like the ceramics of Zampia those of Tumulus 5 were remarkable for being largely decorated with rouletted cord-wrapped elements (55% of motifs); such high percentage separate these assemblages from Windé Koroji facies sites where such roulettes are comparatively scarce (*ca.* 10%) and which instead feature larger quantities of fine twisted cord roulettes (*ca.* 40% of motifs) and impressed, rather than rouletted, cord-wrapped elements (MACDONALD 1994, 1996). As such, it is hypothesised that this alignment of monuments at WKO is subsequent to the site’s domestic occupation.

Both WKO-I and WKO-II feature ceramic and stone tool assemblages that correspond to the surface assemblage of the site (see descriptions and illustrations in MACDONALD 1996). Indeed, when the surface and excavated assemblages from Windé Koroji Ouest were first studied, parallels were immediately drawn between its ceramics and lithics and those of Karkarichinkat in the Tilemsi Valley (MACDONALD 1994). Statistical analyses (MACDONALD 1996: Fig. 8) and MANNING’s (2008) excavations in the Tilemsi Valley have in large part borne out an affiliation, if not synonymy, between these two archaeological entities. One strong point of comparison is pottery decoration, where knotted cord, twisted cord roulettes and cord-wrapped elements (whether impressed or roulet-

ted) are major elements in both traditions. Likewise, both lithic industries feature comparable hyper-denticulated leaf-shaped, triangular and tanged projectile point forms whose manufacture dominates lithic reduction sequences. Finally, radiocarbon dating from the Tilemsi Valley (MANNING 2008) indicates widespread de-population of the region around 2000 BCE, the point at which Windé Koroji Ouest was occupied (see below). On these bases we hypothesise a degree of cultural relatedness between the lower Tilemsi Valley and Windé Koroji traditions.

As the primary subsistence data from Windé Koroji Ouest comes from excavation unit WKO-I we will now briefly describe it in plan, stratigraphy and dating before moving on to the discussion of its ecofactual assemblages.

Excavation Unit WKO-I

WKO-I was a 2 × 2 m excavation attaining a depth of *ca.* 100 cm below surface before reaching sterile soil. It was excavated by trowel and hand mattock (“*dabba*”) stratigraphically (not by arbitrary spit). Five stratigraphic layers were recorded in order of excavation:

- Layer I – Surface wash, loam with eroded artefacts and bone fragments.
- Layer II – Semi-sterile, sandy loam surrounding and partially overlying Layer III.
- Layer III – Midden deposit, ashy sand; directly overlying Layer IV.
- Layer IV – Sunken round house feature with hearth, ashy sand.
- Layer V – Sterile basal levee soil, loam with clay.

Excavated context numbers are associated with these layers as follows:

- I = 1, 2
- II = 4, 5, 10, 12
- III = 3, 6, 7, 8, 9, 11
- IV = 14, 15, 17, 19
- V = 13, 16, 18, 20

These layers may be combined and re-ordered into the following sequence of three depositional horizons:

- **A** – Initial occupation, “sunken” round house with hearth and domestic debris (*ca.* 2100-1900 BCE); Layer IV.
- **B** – Later occupation, use of locality as a midden with accumulated bone, shell and potsherds (*ca.* 1600-1100 BCE); Layer III.
- **C** – Abandonment/deflation surface, probably including some sub-recent material and material from local tumulus-building, mixed with materials eroding out of Horizon B (undated, post 1600 BCE); Layers I and II.

The sunken round house in Horizon A is a remarkable feature. Cut vertically into the original levee, it is circular and can be reconstructed to a diameter of approximately two metres. Off centre, in its NW quadrant, is a clearly defined hearth, with burned red soil, shored-up with large potsherds and containing ash and bone fragments (Fig. 3). Throughout Layer IV were fragments of burnt daub, suggesting wattle and daub walls for this semi-subterranean structure. Although not as extreme in depth as historic Bobo semi-subterranean dwellings – probably only a 50 cm step-down – it is reminiscent of the many Middle Niger traditions of first peoples having “emerged” from such “holes” in the riverbank (LEMOAL 1960; SHINZO 1990: 220-221).

Two conventional radiocarbon dates were run on wood charcoal samples from the excavations. The earliest of these is associated with Horizon A, and came from the hearth feature in context 17: 3635±90 bp (GX-19990), calibrated to 2136-1893 BCE (one sigma). The more recent date is from the midden, context 7: 3115±195 bp (GX-19234), calibrated to 1612-1123 BCE (one sigma). As the midden directly over-fills the sunken structure, and there is no visible change in associated material culture (similar vessel forms and décor dominated by fine twisted cord roulettes, knotted cord roulettes, impressed cord-wrapped elements and impressed net), we believe it unlikely that the occupation in this area truly comprised a thousand year span. We are likely looking at only a limited extension of the more reliable hearth date’s 2100-1900 BCE range, perhaps to 1400 BCE if we take the maximum of the second date’s calibrated probability range as our guide.

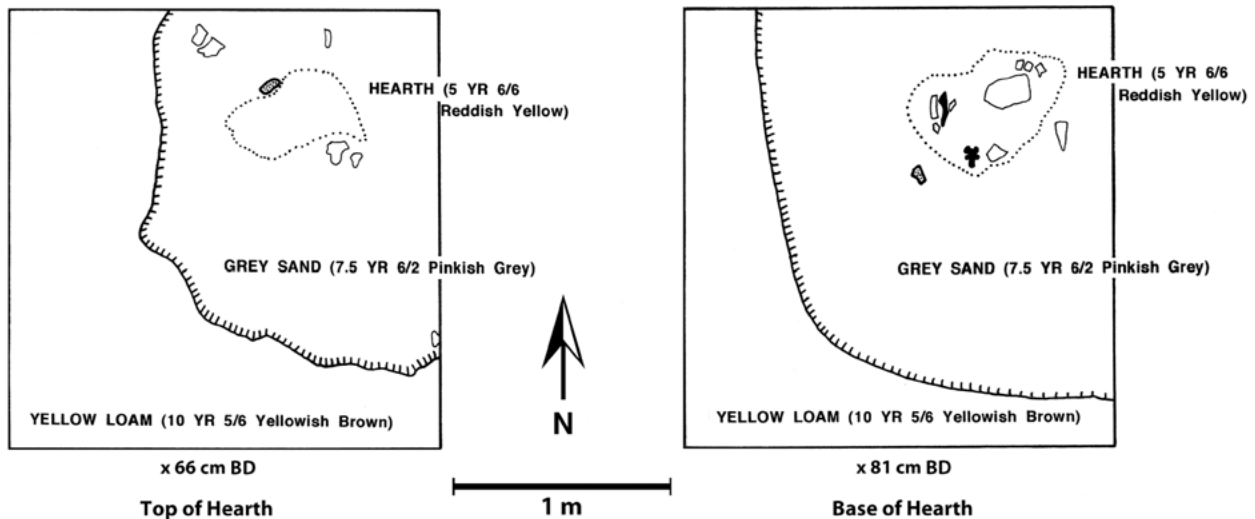


Fig. 3. Plan of excavations at WKO-I showing the extent of the sunken round house and the location of the hearth (both plans are within Horizon A). Depths are BD (below datum) which was established 10 cm above surface at the SW corner of the excavation unit. Colour references are in comparison to a standard Munsell soil colour chart. Unshaded objects are potsherds, black objects are bone, and stippled objects are stone.

Palaeoenvironmental Indicators: Geomorphology, Shell, and Wood Charcoal

The “Gourma des Monts” is abutted to the north and west by the Lacustrine Gourma, an area riven with palaeochannels. Evidence for palaeohydrological activity takes the form of a network of east-west running wadis or palaeochannels, connecting the region with the Inland Niger Delta floodplain. Beyond the immediate vicinity of the Gandamia escarpment there are two other major hydrological environments in the southwestern Gourma: the true “lacustrine Gourma” (Lac Korarou and environs), and the dunefields of the Gourma proper (the *Haut* or Upper Gourma). Lac Korarou lies approximately 40 km to the north-west of Douentza. It has received floodwaters from the Niger along its tributary channel (the Koradou) as recently as the 1970s, but since then has existed only as an isolated ponding area (BLANCK ET AL. 1996). During the Holocene African Humid Period (AHP) the lake would have been perpetually filled and would have created its own inundated plain to the westwards. It is therefore likely that the high floods during the Holocene AHP would have brought the Inland Delta floodplain to the western edge of the Dyoundé massif. Indeed, locals have recounted years in the 1950s and 1960s when the flood (*crue*) attained Dèbéré, only 10 km from the western tip of the massif. However, BLANCK ET AL. (1996) state that strong and persistent overflows from Lac Korarou to the west probably did not continue after the beginning of current climate conditions, which commenced not long after *ca.* 2000 BCE (BLANCK ET AL. 1996: 117).

Some local hydrological evidence can be drawn from the shells recovered from the WKO-I excavations. Analysis of this assemblage was undertaken by a student researcher, Chloe Jackson, using collections of the London Natural History Museum with confirmation of identifications by Peter Mordon and Fred Naggs, both of that museum. Over 1000 fragments were analysed with only those diagnostic specimens enumerated in Table 1. Given the large size of the assemblage it is interesting that only four taxa were present, including two gastropod and two bivalve species. The occurrence in quantity of freshwater snail *Lanistes varicus* and the freshwater bivalves *Asparthia chaiziana* & *dahomeyensis*, without the presence of bivalve taxa requiring perennial waters, is a good indication of a seasonal floodplain environment: all three taxa are capable of surviving long periods of drought by estivating in mud. Likewise, they still occur in the Inland Niger Delta and adjoining lacustrine regions. It is noteworthy that *Asparthia* are parasitic of fish in their larval stage and require their assistance for propagation, indicating at least a seasonal connection to permanent waters (VAN DAMME 1984). *Asparthia* and *Lanistes* are both edible and supply shells which may be used for functional or decorative purposes, explaining their presence at the site. However, the frequency of the very small, extended conical shells of the air-breathing, terrestrial gastropod *Subulina* sp. is more difficult to explain, except that they tend to occur in damp, arboreal locales within leaf litter.

Taxon	Horizon A	Horizon B
[Class]	House	Midden
[Genus and species]	ca. 2100-1900 BCE	ca. 1600-1100 BCE
Gastropoda		
<i>Lanistes varicus</i>	128	82
<i>Subulina</i> sp.	31	26
Bivalvia		
<i>Asparthia chaiziana</i>	17	5
<i>Asparthia dahomeyensis</i>	24	19

Table 1. Total numbers of diagnostic gastropod and bivalve specimens from WKO-I by horizon.

Regarding woodland, there is good evidence that Windé Koroji Ouest was near or within a gallery forest during its occupation. The archaeobotanist Dirk Uebel was able to examine the WKO wood charcoal as a side-project during his larger study of the Tongo Maaré Diabel wood remains. In total, 153 pieces were identified from both WKO-I and WKO-II showing no spatial or temporal differentiation. The most important taxa were *Khaya senegalensis* (African mahogany, 33%), *Rubiaceae* (flowering trees, probably *Mitragyna*, 21%), *Anogeissus leiocarpa* (African birch, 19%), *Tamarindus indica* (tamarind, 9%), *Acacia raddiana* (umbrella-thorn acacia, 8%), *Prosopis africana* (iron tree, 6%), and *Acacia albida* (apple-ring acacia, also known as *Faidherbia albida*, 3%). All major taxa come from what would be riverine, savanna gallery forest. The presence of *Acacia albida* is of particular interest as it is associated with millet agriculture and livestock economies, combining the provision of important dry season leaf fodder for livestock, while adding significant fertility to agricultural fields (WICKENS 1969; GIFFARD 1971).

Overall, environmental indicators suggest that during its occupation Windé Koroji Ouest was situated at the eastern end of the Inland Niger Delta floodplain, in a gallery forest zone – a substantially more humid and verdant environment than today.

The Macrobotanical Remains

The charred macrobotanical remains from Windé Koroji Ouest (WKO) serve to provide important information on early pearl millet cultivation. Preliminary work on a few WKO samples by Cecilia Capezza, including the initial identification of domestic millet from the site, has been significantly expanded in a new analysis of all samples by Louis Champion.

Twenty-six litres of soil flotation samples (in ten samples) were collected from the midden and the sunken hut/hearth in WKO-I. Hand-picked specimens, invariably nut or larger seed fragments, were also identified. Sampled sediments from the excavations were processed manually by bucket flotation. The flots were collected on a 0.25 mm mesh and air dried in a single bag. Each sample was sieved into five size fractions: >4 mm, 2-4 mm, 1-2 mm, 0.5-1 mm, <0.5 mm. The ≥0.5 mm sub-samples were scanned for charred plant structures such as seeds, fruits, nutshell and parenchyma with the aid of a low-power stereomicroscope (10-40x). Some modern uncharred plant material were also separated from the charred remains and rejected during this process. After sorting, the charred remains were identified by comparing taxa with specimens in the modern reference collection housed at the Institute of Archaeology, University College London.

For all the samples analysed, whole vegetal items were recorded by count in a list of taxa, from which tables of relative frequency were constructed (Tab. 2). Within the ten floated samples, two proved to be completely devoid of plant remains. In total, 197 grains and fruits remains were identified.

Period	Context	Samples (n)	Volume (litres)	Indet. seeds frag.	<i>Pennisetum glaucum</i>	<i>Panicum</i> sp.	Gramineae	<i>Vitex doniana</i>	<i>Lannea microcarpa</i>	<i>Sclerocarya birrea</i>	cf. <i>Legume</i>	cf. <i>Chenopodium</i>	cf. <i>Diospyros mespiliformis</i>	Total	
Horizon A	8	1	2	1				1	3	1				6	8
	7	1	4	13	2	1		6	1		2			12	5
	7A													0	8
	7B													0	8
	6	1	6	1	3			3						7	10
	6,7 (a & b),8	3	12	15	5	1		10	4	1	2			38	39
% frequency				39	13	3	0	26	11	3	5	0	0	100	
Horizon B	9	1	?	1										1	
	5	1	8	1	6								1	8	20
	4	1	2	1										1	20
	3	1	2											0	
	3,4,5,9	4	12	3	6								1	10	40
% frequency				30	60	0	0	0	0	0	0	0	10	100	
Horizon C	2	1	1	9	1	1					3	1		15	10
	1	1	1	7	5		3							15	30
	1,2	2	2	16	6	1	3				3	1		30	40
	% frequency				53	20	3	10				3		100	
Total		9	26	34	17	2	3	10	4	1	5	1	1	78	119
	% frequency				44	22	3	4	13	5	1	6	1	1	100

Table 2. A summary of the archaeobotanical evidence from Windé Koroji Ouest. Total numbers and frequency of identified specimens have been summed across contexts from each horizon and for the site.

The most frequent remains from WKO were seeds of the *Gramineae* family. While many of them (44%) are too fragmentary to yield closer taxonomic identification, a number of seeds have been positively identified as *Pennisetum glaucum* (pearl millet) on the basis of their morphological characteristics (Fig. 4). They were all seen to have the typical club-shaped to spherical profile with a thick apical part, characteristic traits of the domesticated pearl millet grain (BRUNKEN ET AL. 1977; D'ANDREA ET AL. 2001; ZACH & KLEE 2003; MANNING ET AL. 2011).

In 1994, direct AMS dates were attempted by the Oxford radiocarbon lab on the two millet grains (from WKO-I context 19) shown in Figure 4. Unfortunately this direct dating attempt was unsuccessful due to insufficient carbon. However, as 17 charred seeds of *Pennisetum glaucum* (pearl millet), representing 22% of the total

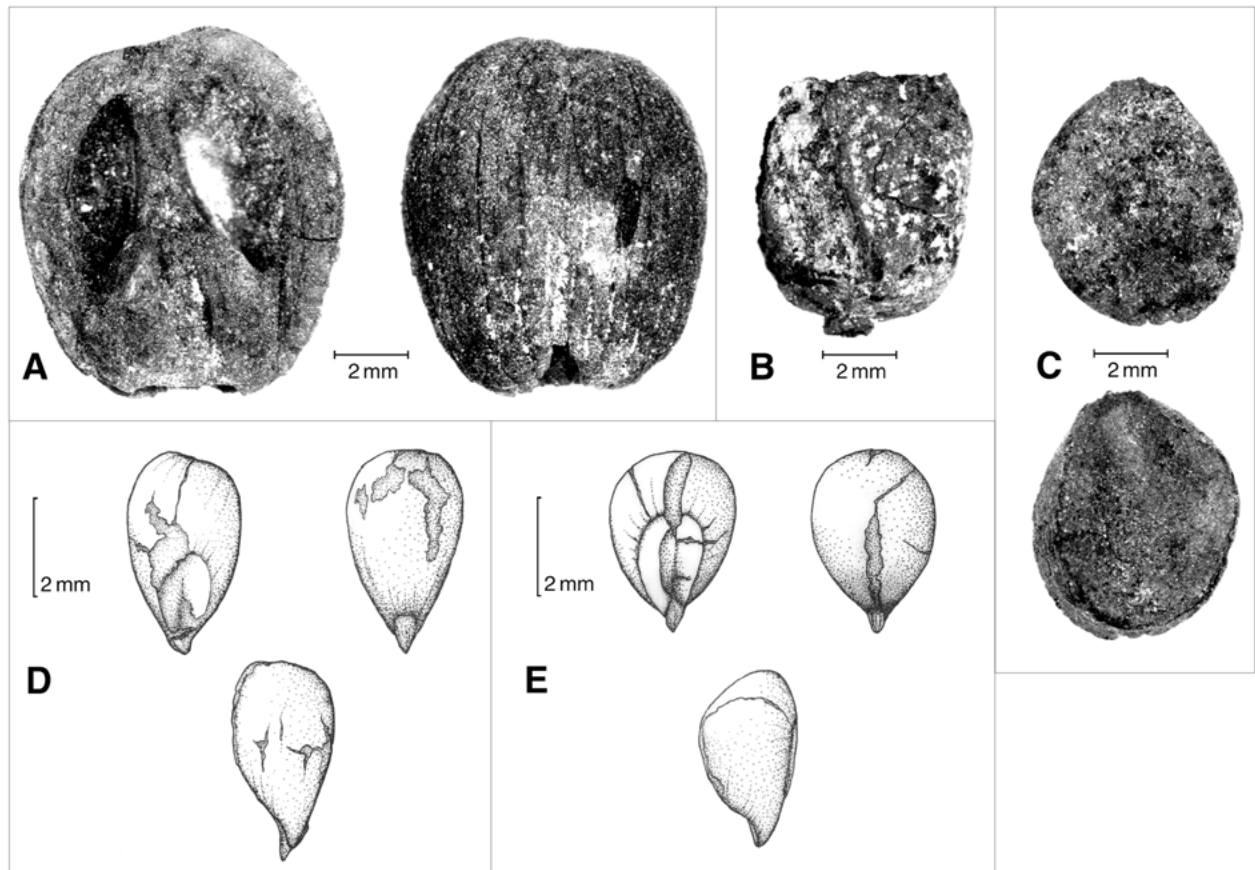


Fig. 4. Examples of identified botanical remains from WKO-I: A = Fruit of *Vitex doniana* from context 7; B = Fruit of *Lannea microcarpa* from context 8; C = Fruit of *Sclerocarya birrea* from context 7; D & E = Drawings of the *Pennisetum glaucum* grains from context 19.

assemblage, have been found in all the three occupation phases of the site, including in the early hearth feature, it is reasonable to assert that domestic millet was present at the site throughout its occupation, including the earliest dated occupation of *ca.* 2100 to 1900 BCE.

In the Sahel zone, two regional trajectories in the spread of pearl millet cultivation emerge from the archaeobotanical data. The first documented radiation of domestic millet was identified in Mauritania by MUNSON (1976), apparently spreading outwards into Senegal and the northern edge of the Middle Niger. In south-eastern Mauritania pearl millet impressions have subsequently been directly dated in ceramics from the Dhar Nema region to 1750-1500 BCE (FULLER ET AL. 2007; MACDONALD ET AL. 2009), and from Dhars Tichitt and Oualata to 1900-1500 BCE (AMBLARD 1996). The second, more recently documented trajectory comes from north-eastern Mali, in the Lower Tilemsi Valley, which produced an extensive suite of pearl millet samples dating to between 2500 and 2000 BCE (MANNING ET AL. 2011). These are at present the earliest morphologically domestic millet grains known from Africa. Elements of this more easterly domestication event then appears to spread rapidly along a north-south corridor into the Malian Gourma (Windé Koroji) and on to the sites of Ounjougou in the southern Bandiagara (OZAINNE ET AL. 2009), before appearing in northern Ghana, all by *ca.* 2000 BCE (D'ANDREA ET AL. 2001, 2007).

Amongst the fruits from WKO the most common remains belong to *Vitex doniana* (black plum) common in woodland savanna areas but only occasionally found in the southern Sahel (MAYDELL 1986; CISSÉ 1991). This tree is sometimes planted for both its fruits and the young leaves which are used as a pot herb. The fruits are edible and produce a sweet beverage (DALZIEL 1937; MAYDELL 1986; CISSÉ 1991). The presence of black plum trees which require a higher ground water table seems to indicate that the ecology of the site in the second millennium BCE was much more humid than today. In the same horizon as the black plum, we found fruit

remains attributed to *Lannea microcarpa* (African grape), another woodland savanna tree that usually grows in wetter conditions. Its fruits, which ripen during the rainy season, are edible and are especially appreciated for making an alcoholic drink (MAYDELL 1986; CISSÉ 1991). The presence of both *Vitex doniana* and *Lannea microcarpa* in the initial occupation phase of the site (2100-1900 BCE) is an indication of the presence of a river or a water table close by, which could support tropical gallery forests or extrazonal vegetation north of where these would normally occur. *Vitex* is regarded as typical of Sudano-Guinean vegetation, restricted to the far south of Mali under modern climatic conditions, while *Lannea* is found in the Sudanian zone (EICHHORN & NEUMANN 2014). As shown in Table 2, the analyses suggest potential change through time with these two fruit taxa being present in Horizon A, but disappearing afterwards. This may suggest a trend of aridification, however, due to small sample sizes, caution should be applied. Wood charcoal of both these taxa are reported from Ounjougou in the Middle Holocene period (EICHHORN & NEUMANN 2014). Neither appears in the WKO wood charcoal studied by Uebel (see above).

Also present at WKO are remains of *Sclerocarya birrea* (marula tree). The fruits, which ripen between April and June, are edible and a fermented drink is obtained from their juice. An oil used for food preparation is also extracted from the kernel (DALZIEL 1937; CISSÉ 1991).

Only one seed of cf. *Diospyros mespiliformis*, the West African ebony tree, was recovered from a sample in Horizon B. The tree is often in a state of semi-cultivation (DALZIEL 1937: 348) and frequently goes uncut because of associations with tree spirits across many West African societies (BLENCH 2001). The fruits of this savanna tree are edible fresh or dried and they are also used for beverages or jam and to produce a concentrated juice used for various purposes (CISSÉ 1991). *D. mespiliformis* is also part of the Sudanian vegetation zone (EICHHORN & NEUMANN 2014).

All of these fruit species are characteristic of the savanna woodlands of West Africa. They are also taxa typically associated with savanna agriculture and have been reported from other archaeobotanical studies, such as *Sclerocarya* type fruits from Iron Age Walaldé in Senegal (MURRAY & DEME 2014), or *Sclerocarya*, *Vitex* and *Diospyros mespiliformis* from northern Burkina Faso at medieval Saouga (NEUMANN ET AL. 1998). To this end, assemblages of edible fruit trees are often associated with traditional savanna agroforestry, with pearl millet cultivation and permanent settlements. Whether these early finds represent the establishment of such systems at Windé Koroji is uncertain and requires further research.

The Faunal Remains

The analysis of the WKO fauna was not completed until a few years ago, despite the earlier publication of some preliminary results (*i.e.* MACDONALD & MACDONALD 2000). The present re-analysis by MacDonald and Manning was spurred on by LINSEELE (2007: 123, 137) who had questioned the identification of domestic cattle at Windé Koroji. On the basis of an isolated large bovid first phalanx measurement from the site, which we published in 2000, she postulated that the WKO cattle may have all been African buffalo. In the absence of a complete faunal report her concern was fully justifiable, especially since the faunal remains from Windé Koroji do indeed include both *Bos* (cattle) and *Syncerus* (African buffalo). Before discussing the results from our analysis, we must first discuss some methodological issues, including the differentiation of *Bos* and *Syncerus*.

Work on the WKO faunal assemblage was undertaken with the aid of comparative collections at the UCL Institute of Archaeology, the Natural History Museum (London), and the authors' [KCM and KM] personal collections. The separation of *Syncerus* from *Bos* was particularly assisted by Joris PETERS' (1986) manual on the subject. Attribution to one taxon or the other was only made when morphological criteria included the taxon identified and excluded the other. Examples of some of these differentiations may be seen in Figure 5. Elements which could not be clearly differentiated were classed as *Bovinae* (*Syncerus* or *Bos*). Highly fragmentary or undiagnostic elements were left at size class (*e.g.* large bovid). Bovid size class boundaries follow those set out in previous work on the Jenné-Jeno fauna (MACDONALD 1995: Table 7.1). Remains were quantified conventionally by NISP (Number of Individual Specimens Present) and MNI (Minimum Number of Individuals). NISP was calculated in such a way that mandibles with associated dentition – even if loose – were classed as a single specimen, reconstructed long bones were treated likewise. No ribs were identified or counted.

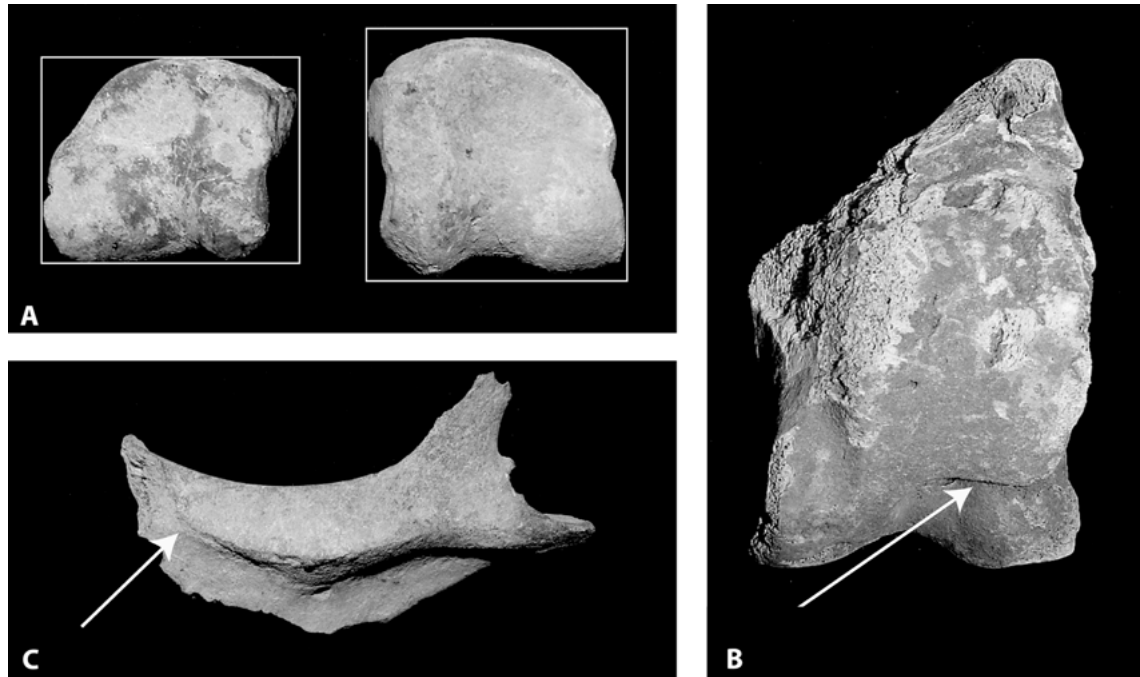


Fig. 5. Morphological diagnostics of *Bos* sp. from WKO-I: A = Magnum (os carpale II+III), the example on the left is *Bos* sp. from context 3, that on the right is *Syncerus caffer* from context 1. Note the rectangular (*Bos*) versus square (*Syncerus*) habitus of these two examples (see PETERS 1986: trait 19, pp. 6 and 19); B = Astragalus (talus), the example is *Bos* sp. from context 6. Note that the lateral groove shown by the arrow is present in *Bos* but not in *Syncerus* (see PETERS 1986: trait 32, pp. 8 and 21); C = Jugal, *Bos* sp. from context 8. Note that the margin of jugal is more rounded and fuller in *Bos*, while it is thinner and more angular in *Syncerus*.

The assemblage from WKO-I was, on the whole, very well preserved with no erosion or leaching, although there were some carbonate encrustations. 19% of the 269 identified mammal, bird and reptile bones showed traces of charring; bovid remains in particular were frequently burnt (51%), suggesting the roasting of meat.

In **Horizon A** (ca. 2100-1900 BCE) at WKO-I there is a distinct dominance of warthog remains, accounting for over 75% of the total mammalian NISP (Tab. 3). Domestic cattle are apparently absent from this layer, although there are some *Bovinae* and large bovid remains which *might* represent cattle. However, there are definite livestock present in the form of domestic sheep (*Ovis aries*), which account for 3% of the mammalian fauna, or 6% if *Ovis/Capra* (sheep or goat) and small medium bovids are included (Fig. 6). A sheep first phalanx from context 14, layer IV, measures (in mm): GL=41.2, GLpe=40.7, Bp=13.3, Bd=12.3, and would thus appear to be within the range of non-dwarf savanna varieties.

The wild mammalian fauna from the site's initial occupation are consistent with a wooded savanna mosaic near standing water. The red-fronted duiker (*Cephalophus rufilatus*) and the roan antelope (*Hippotragus equinus*) in particular are fond of woodland edges or open woodland. The African buffalo (*Syncerus caffer*) tend to range within distance of standing water and were likely to have been wet season visitors. The comparative slaughter of warthogs (*Phacochoerus aethiopicus*) may be ascribed to their extreme territoriality, making them vulnerable to over-hunting. There is also a great diversity in the occasional game whose scattered remains were left in the sunken house of layer IV, including guineafowl, francolin, aardvark, large rodents, Nile monitor lizards, terrapins, snakes, and even crocodiles.

In **Horizon B** (ca. 1600-1100 BCE) the faunal spectrum appears to fall more in line with "pastoral expectations". Definite cattle remains (*Bos* sp.) are relatively abundant in Horizon B, from ca. 1600 BCE. In this later phase at WKO, domestic *Bos* account for 23% of mammalian remains, or for over 40% if *Bovinae* are included in this tally. There are no clear sheep/goat remains in the midden layer, although the seven small medium bovid elements could be attributable to them. Regarding wild fauna there is little perceptible change apart from the sharp decline in warthog, perhaps due to the aforementioned territorial over-hunting, and there is also a slight decline in taxonomic diversity (13 to 9 wild taxa recorded). The addition of waterbuck (*Kobus ellipsiprymnus*) and kob (*Kobus kob*) is consistent with the waterside gallery forest fauna of the previous horizon.

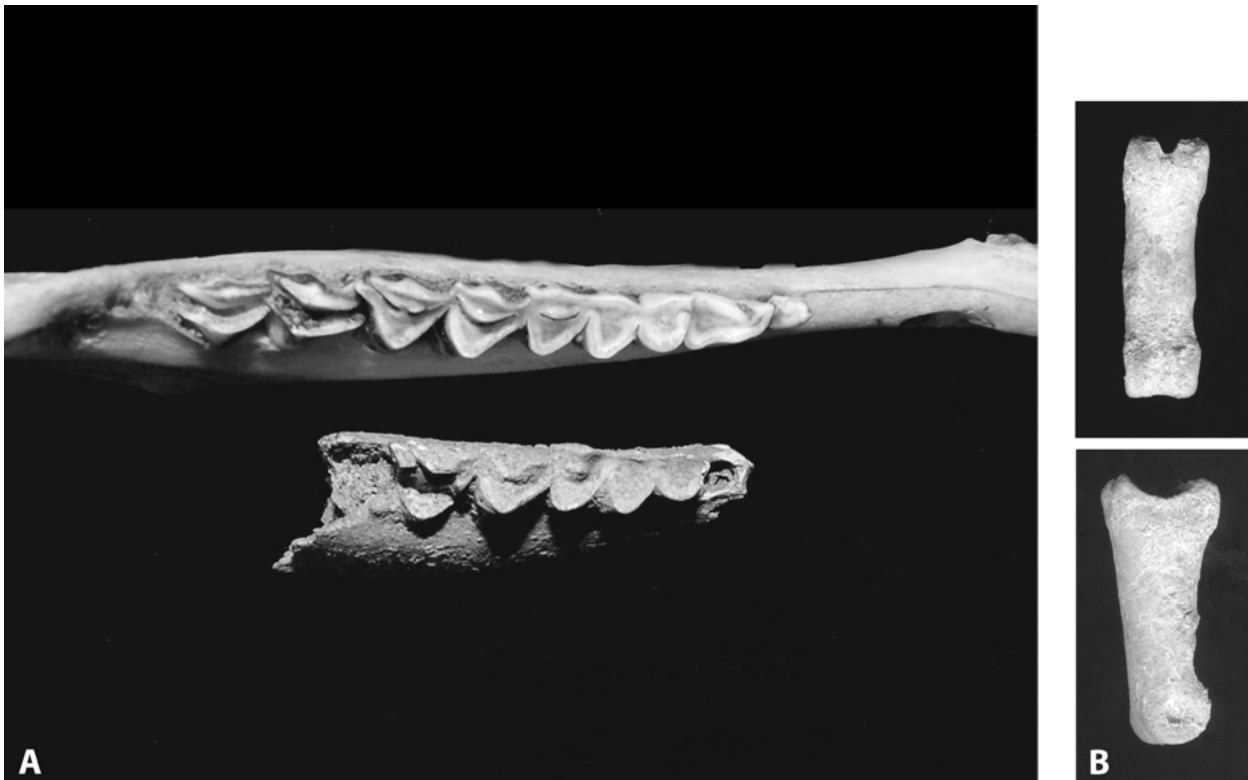


Fig. 6. Morphological diagnostics of *Ovis aries* from WKO-I: A = Comparison of a modern Malian *Ovis aries* reference specimen from Dia (collected 1999) of the same dental stage as an example from context 19. Note especially the dp4 where pillars typical of *Capra* are absent; B = *Ovis aries* first phalanx from context 14 in two views.

The morphologically identifiable *Bos* sp. (cattle) of Horizon B are fragmentary but suggest a relatively large breed. The following are the available measurements (in mm): First phalanx, context 3, layer III, GLpe=65.8, Bp=36.6, Bd=32.7; Magnum, context 3, layer III, GD=32.5, GB=36.4; Metacarpal, context 3, layer III, Bd=63.4, Dd=34.1; Astragalus, context 6, layer III, GLI=72.3, DI=38.3; Scaphoid, context 6, layer III, GD=41, GH=32.1.

Remains from **Horizon C** (post 1600 BCE), while listed in Table 3, are not considered in detail here as they are few in number, derive from surface deflation and therefore are either eroded from Horizon B or may be relatively recent. It is, however, worth noting two elements of goat (*Capra hircus*) from Horizon C. These are the only two bones of this taxon identified from the site, and suggest a dwarf variety not present in the region today (in mm): Astragalus, context 1, layer I, GLI=23.3, GIm=21.4; Dm=14.0, DI=12.5.

As concerns fish remains, only one portion of the assemblage (that from Horizon A) was available for study, a previous UK analyst having “mislaidd” the Horizon B samples. However, initial counts indicate that absolute fish bone counts (NISP) between the two horizons were similar. The material from Horizon A, layer IV, has been fully analysed by Manning (Tab. 4). The results are not unexpected. Size reconstruction across the taxa indicates fishing without access to deeper channels or permanent waters where larger specimens can be had or, in other words, a floodplain-focused exploitation. Most fish are in the 20-30 cm range and only a single catfish (*Auchenoglanis* sp.) would have exceeded 100 cm in length and was probably brought in from farther afield. Certainly the *Tilapia* (<20 cm to 50 cm size range), *Lates* (20-30 cm size range) and *Synodontis* (30-50 cm size range) could have come from floodplain waters, or local channels, in the peak flood season.

So, returning to the faunal assemblage as a whole, how can we account for the striking differences in faunal profiles between Horizons A and B? Analysis of wood charcoal from the site by Dirk Uebel indicates that it was in proximity to riverine gallery forests in Horizons A and B. This is further attested by the presence of antelope species such as *Cephalophus rufilatus*, *Hippotragus equinus* and *Kobus ellipsyprimnus*. Thus, particularly during the wet season, it was unlikely for this inundated region to provide suitable pasture for grazing, and it may have fostered waterborne disease, explaining the relative absence of cattle in contrast to agropastoral sites in the Lower

Taxon	Horizon A	Horizon B	Horizon C
	ca. 2100-1900 BCE	ca. 1600-1100 BCE	1600 BCE onwards
<i>Phacochoerus aethiopicus</i> (warthog)	4 // 92	3 // 9	0
<i>Hippotragus equinus</i> (roan antelope)	1 // 1	1 // 1	0
<i>Cephalophus rufilatus</i> (red-fronted duiker)	1 // 2	0	0
<i>Kobus ellipsiprymnus</i> (waterbuck)	0	1 // 6	0
<i>Kobus kob</i> (<i>kob</i>)	0	1 // 1	0
<i>Syncerus caffer</i> (African buffalo)	1 // 2	2 // 10	1 // 5
<i>Ovis aries</i> (sheep)	2 // 2	0	0
<i>Capra hircus</i> (goat)	0	0	1 // 2
<i>Ovis/Capra</i> (sheep/goat)	x // 1	0	0
<i>Bos sp.</i> (domestic cattle)	0	3 // 20	1 // 2
Bovinae (cattle or buffalo)	x // 1	x // 12	x // 2
Small bovid	x // 1	0	0
Small medium bovid	x // 4	x // 6	x // 1
Large medium bovid	x // 2	x // 12	0
Large bovid	x // 4	x // 6	x // 1
<i>Orycteropus afer</i> (aardvark)	1 // 3	0	0
Carnivora indet. (indet. carnivore)	x // 1	x // 1	0
<i>Mellivora capensis</i> (honey badger)	0	0	1 // 4
<i>Thryonomys swinderianus</i> (cane rat)	1 // 2	0	0
<i>Francolinus bicalcaratus</i> (double-spurred francolin)	1 // 1	0	0
<i>Numida meleagris</i> (Guinea fowl)	1 // 5	0	0
Columbidae (pigeon or dove)	0	1 // 1	0
Serpentes (indet. snake)	1 // 1	0	0
<i>Varanus niloticus</i> (Nile monitor lizard)	1 // 11	0	0
Pelomedusidae (freshwater terrapins)	1 // 4	1 // 8	0
<i>Crocodylus sp.</i> (<i>crocodile</i>)	1 // 1	1 // 5	1 // 1

Table 3. Summary of identifiable faunal remains from WKO-I aggregated by occupational horizon. Note that the numbers on the left are MNI and those on the right are NISP.

Tilemsi Valley (MANNING 2008, 2011). It should be noted that in the Tilemsi there was no significant floodplain year around, while the wet season at Windé Koroji would have been problematic for herds of cattle.

Seasonality indicators from the early occupation at Windé Koroji include fruit pits of *Vitex doniana* and *Scro-carya birrea*, which both only ripen in the wet season, as well as extensive shallow water fish remains, principally *Clarias* and *Tilapia*, indicative of floodplain exploitation. Interestingly, the post-1600 BCE occupation (Horizon B) – when cattle are present – lacks comparable botanical indicators, but still possesses fish remains, crocodile and freshwater terrapin remains. It is therefore possible that the initial occupation of the site was confined to the wet season, making the presence of cattle unlikely, with a shift to some occupation outside of the peak flood (fruit

Taxon	Size Range	Horizon A ca. 2100-1900 BCE
<i>Auchenoglanis</i> sp.	<20 cm	2
	20-30 cm	15
	30-50 cm	1
	100+ cm	1
<i>Clarias</i> sp.	<20 cm	4
	20-30 cm	55
	30-50 cm	93
	50-100 cm	19
	indet. size	23
<i>Synodontis</i> sp.	30-50 cm	3
<i>Lates niloticus</i>	20-30 cm	5
	30-50 cm	1
Tilapiini	<20 cm	21
	20-30 cm	61
	30-50 cm	14

Table 4. Summary of identifiable fish remains from WKO-I, for Horizon A only (those from Horizon B were not available for analysis). Numbers are counts of identified diagnostics within each reconstructed size range estimated by comparison with modern reference specimens of known length.

tree) season in the subsequent period. Alternatively, occupation at Windé Koroji might straddle an ecological shift, with more permanent inundation giving way over time to drier and less forested landscapes, facilitating the presence of cattle. Regardless, we can be certain that the initial inhabitants of WKO were practicing millet cultivation, or at least had access to domestic millet grain, and were keeping sheep. It is thus unlikely that they would not have been familiar with cattle (present by this time in the Lower Tilemsi Valley), even if they were not keeping and slaughtering them at this site until after 1600 BCE.

Conclusions

Windé Koroji Ouest is not a site in isolation. It existed within wider, mobile subsistence networks which undoubtedly moved between the edge of the ancient Niger floodplain and areas deeper within the Gourma. Indeed, it is instructive to consider it in the context of coeval agro-pastoralist groups in the Lower Tilemsi Valley with which its material culture has been compared (MACDONALD 1996). Around 2000 BCE the populations of the Windé Koroji Complex and associated groups in the Lower Tilemsi Valley, despite having a relatively homogeneous material culture, exhibited an interesting range of agro-pastoral adaptations (MANNING 2011). All feature strong components of hunting and fishing, coupled with millet cultivation and the gathering of wild fruits. Relative herd compositions varied, with cattle or ovicaprids sometimes absent, or varied in their proportions. Overall, this indicates a very flexible economic strategy, unwedded to any particular resource – except, perhaps,

millet – and probably featuring decreasing mobility for core groups (attested by early structural remains at both Karkarichinkat and Windé Koroji). Such (semi-)sedentary loci were probably coupled with mobile herd segments whose presence or absence at any point on the landscape was determined by water and pasture resources, as well as seasonal disease vectors. Such adaptations differ from other contemporary, historically and archaeologically attested peoples of the Inland Niger Delta who tended to specialise in one subsistence activity, trading symbiotically to increase their dietary breadth and food security (McINTOSH 1998; MACDONALD 1999).

In summary, our analysis of organic remains from Windé Koroji Ouest opens a precious, if narrow, window on the environment and subsistence strategies at the eastern margin of the Inland Niger Delta between *ca.* 2100 and 1400 BCE. At that time the site was located at the edge of a stream, close to the Niger's floodplain surrounded by savanna gallery forest. Domestic millet and sheep are present from the site's earliest occupation, as well as evidence for hunting, fishing, mollusc gathering and the exploitation of arboreal fruits. It appears that after 1600 BCE either more arid conditions prevailed, or mobility patterns changed, allowing the seasonal presence of domestic cattle.

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