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Living among blacksmiths? Preliminary archaeological results of the 2023 campaign at the Kpeta 2 settlement (Benin).

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Introduction

Since 2019, the AFRICA project "*Archéoméallurgie du Fer : Ressources, Identités et Commerce en Afrique*" (dir. C. Robion-Brunner, D. N'Dah and E. Batchana) has been investigating the place of iron in medieval and modern West African societies (Robion-Brunner et al. 2022; Robion-Brunner 2024). It documents the variability of resources, manufacturing techniques, distribution networks and consumption patterns. Beyond endogenous traditions, the project's ambition is also to assess to what extent the massive importation of European iron, between the sixteenth and nineteenth centuries as part of the "Atlantic" trade, had an impact on African ironmaking activities. This research is carried out in two areas known for their significant iron production over the last millennium: the Bassar country in Togo and the Mono-Couffo region in Benin.

This article focuses on the second zone, where a group of metallurgical sites (slag heaps, eroded furnaces) and domestic occupations (anthropogenic mounds, surface deposits) were identified during pedestrian surveys in the Aplahoué locality (Figure 1.A). Among them is Kpeta 2, a mound located some 200 m south of the metallurgical waste pile named Kpeta 1 (Figure 1.B). The latter was mainly used between the fourteenth and early fifteenth centuries. Today used for agriculture, the surface of Kpeta 2 is covered with numerous fragments of ceramics and macro-lithic tools (handstones, grinding slabs fragments). In 2021, a large concentration of contiguous sherds in an erosion zone to the north of Kpeta 2 mound suggested the presence of pavements. Documented from the northern Dendi region (Haour 2019) to the south of Benin (Randsborg & Merkyte 2009) and Nigeria (Roth et al. 2021; Roth 2023), these interior and exterior floor coverings are made up of pottery sherds laid out flat and/or on the side. Considering these remains, could Kpeta 2 correspond to an ancient settlement contemporary with the iron-reduction activities carried out on the neighboring Kpeta 1 site?

In 2021, a first test survey of 3x2 m carried out by N. Labiyi and students from the University of Abomey-Calavi provided the first opportunity to test the site's potential. This work first

confirmed the presence of an ancient pavement made up of flat sherds, approximately 0.15-0.25 m below the surface, continuing westwards under the berm. It rested on a dark layer about 0.40 m thick, containing many small smithing slags. Two sets of bones were also discovered in the lower levels. The first, corresponding to animal remains, laid some 0.55 m below the surface. The second were human and associated to a burial pit dug between 0.75 m and 0.85 m below the pavement level. Radiocarbon dating of charcoal taken from the profiles placed these remains between the early fourteenth and seventeenth centuries (Table 1).

Lab Code	Sample	Radiocarbon date	Calibrated age (2s)*
Muse23027/ECHo5538	Human bone (US 1008)	360 ± 20 BP	1496 CE (95.4%) 1640 CE
SacA66213	Charcoal from slag (under pavement St. 1, equiv. US 1011 ?)	460 ± 30 BP	1430 CE (84.2%) 1504 CE 1593 CE (11.3%) 1616 CE
SacA66214	Charcoal from slag (under pavement St. 1, equiv. US 1011 ?)	590 ± 30 BP	1322 CE (21.1%) 1350 CE 1388 CE (74.3%) 1437 CE
SacA66215	Charcoal from slag (under pavement St. 1, equiv. US 1011 ?)	665 ± 30 BP	1296 CE (95.4%) 1399 CE
SacA66216	Charcoal from sediment associated with pavement St. 1	410 ± 30 BP	1451 CE (52.4%) 1515 CE 1540 CE (43.0%) 1627 CE

*OxCal v4,4,4 Bronk Ramsey (2009); r:5 / Atmospheric data from Hogg et al (2020)

Table 1 – List of samples and related C14 radiocarbon datations from Kpeta 2 after the 2021 campaign.

Methodology

Nevertheless, fundamental points remained to be clarified. The main objectives of the 2023 campaign in Kpeta 2 were to precise the chronological extension of the occupation and to provide a preliminary overview of its spatial organization. To this end, our excavation strategy combines information gathered from both test pits and extensive surveys in different areas of the mound. These operations followed a geomagnetic survey conducted by F. Lévêque, during which only two low-intensity anomalies were detected in the western part of the mound, maybe related to hammerscale. Two excavation sectors were then opened. The first, located to the north of the mound and comprising the first test pit realized in 2021, led to a 48 m² excavation area (Figure 1.B). It resulted from the combination of three adjacent areas of 21 m², 15 m² and 12 m² (Areas 1, 2, 4) that were successively opened to follow the pavement extension. The reopening of the 2021 test pit also allowed to record the stratigraphy on this upper part of the site. Simultaneously, a second 40 m² area was opened to the south-western edge of the mound

(Area 3) where the mound shows a relatively steep slope. Excavations in this part aimed at providing a better understanding of the site's extent and stratigraphy. A 2x1 m test pit was opened for this purpose.

In 2023, the manual recording of remains (ground plans and profiles) was supplemented by photogrammetric surveys, enabling the creation of 3D models and orthophotographs. This method both highly facilitates the creation of detailed plans and contributes to save a precious time during fieldwork if the density of archaeological remains is important.

Excavations on the top of the mound

Firstly, the reopening of the 2021 test pit allowed to reassess the stratigraphy of this upper part of the site. This work revealed that the pavement level then identified (St. 1) rests on eight anthropogenic layers, themselves probably contained in an artificial depression (US 1004a - St. 14) digged on top of the natural substrate (US 1005). This depression could correspond to the pavement's extension and its immediate surroundings. The stratigraphy directly below pavement St. 1 reveals two beds of clayey sediment (US 1013 and 1013bis) separated by a horizontal level of small slag nodules (US 1011), interspersed on either side with two thicker clay-loam layers (US 1003bis and US 1004b). It could materialize foundation and/or circulation levels predating this pavement.

The reexamination of this test pit also contributed to clarify the presence of human bones discovered in 2021, 1 m below the surface. These were contained in a rectangular cavity at least 70 cm wide, slightly bulging at its western end (US 1008a - St. 13). This pit is continued by a vertical shaft which opening was observed at the bottom of US 1003 bis but may be slightly higher (base US 2026). The deep lateral pit (US 1010b) and the funerary shaft (US 1007) show two distinct moments of filling. On the surface, this funerary structure is marked by a small upright stone, initially included in a rectangular orange earthen clayey mass measuring 1x0.6 m (Figure 2, Figure 4.A, C). Radiocarbon dating of a bone fragment placed the individual's death between the end of the fifteenth and the first half of the seventeenth centuries (Table 1)¹. A similar device for sealing and marking the burial on surface may have been discovered to the south of the excavation area (St. 7).

Most of the remains and structures discovered in 2023 seem, however, to refer to the domestic sphere, as two ceramic pavements illustrate. The most important is St. 1, detected as early as 2021. This oval-shape structure of 3.5x3.4 m is mainly made up of sherds laying down, including red-slipped elements (Figure 3.A, B). A few impressions of roulette or incised decorations are occasionally visible, as well as some rims. Clearing of the structure reveals two distinct states of preservation, separated by a central and rectilinear demarcation. While the eastern part of the pavement is globally well preserved, its western side appears very degraded.

¹ Muse23027/ECHo5538: 360 ± 20 BP, cal CE 1496-1640 (2s), calibrated with the OxCal v4.4.4 software (Bronk Ramsey 2009) and the south hemisphere calibration curve SHCal20 (Hogg et al. 2020). In the absence of collagen, the date was obtained on the apatite fraction of the bone. It was prepared at the Laboratoire de datation par le radiocarbone of the Museum National d'Histoire Naturelle in Paris and measured by the ECHoMICADAS of the Laboratoire des Sciences du Climat et de l'Environnement in Gif sur Yvette.

Depressions in the form of contiguous furrows could indicate disturbance due to agricultural activities (Figure 3.C). The pavement edges appear slightly higher than its center (Figure 3.D), possibly resulting from repeated trappings on the paved area. Circular depressions (8 to 20 cm in diameter) - sometimes grouped in pairs and carefully framed by shards - suggest the use of stakes or posts, and therefore a covered space (Figure 3.E). A second pavement (St. 2) was identified some 3 m to the east, on the edge of the excavation zone. The visible part of this pavement also forms an oval shape made of flat sherds. Its edges are elevated and include several circular features (8 to 14 cm in diameter) similar to stakeholes or postholes.

Two structures made up of iron slags were discovered to the southwest of pavement St. 2. The first is an aggregate of decimetric blocks comprised in a sediment rich in slag gravel (St. 4). The north of this structure shows blocks aligned along two perpendicular axes, and a few superimposed blocks on two to three levels on its southern part. St. 4 is located in a depression at least 15 cm deep. The second structure corresponds to a small circular concentration of centimetric nodules carefully arranged around a central depression (St. 5). While St. 5 seems to mark a posthole, St. 4 could be a slag dump or a disturbed domestic structure, such as the base of a granary.

All these structures rest on coherent levels, marked in particular by a compact and laminated floor evoking an outside circulation level (St. 3) directly adjacent to the St. 1 paved area. Further excavations should determine its extension. Furthermore, various concentrations of one to eight elements were recorded, notably near pavement St. 1 (St. 7 and 8). They consist of entire or fragmented handstones and pottery, sometimes referring to several depositional episodes. Indeed, St. 8 is first marked by the deposition of a carinated pot, then two lithic pieces, and finally a set of five spherical handstones and a very small truncated cone-shaped pot with a central depression (Figure 4.A, B, C). The proximity of this deposit to the St. 9 funerary structure, and the fact that this ceramic is seen by local people as a pottery used in voodoo rites, interrogates about its purpose.

A similar question arises for a whole pot (St. 10) discovered in the immediate vicinity of pavement St. 2, and which was held upright by small slag nodules placed at its base. It contained animal bones, covered by two large sherds with morphological traits reminiscent of potter's scrapping tools. Similar examples have been documented in tombs 1 and 2 at the Kana-Damehouégbo site, south-east of Abomey (Merkyte and Randsborg 2009; Randsborg et al. 2010: 115-116).

Excavations on the slope: Area 3

The test survey realized in the eastern corner of Area 3 reveals a very similar stratigraphic organization as to the upper part of the mound, at least for the upper levels (Figure 5.A). The first in situ archaeological structures are located at the top of US 1003. They are sealed by US 1001 and 1002, very thick due to the slope on this side of the mound. These two erosion layers, deposited after the site was abandoned, contained numerous remains of ceramic vessels and fauna.

In the lower levels, a high concentration of iron slag blocks and gravel appeared at the top of US 1003, marking the upper fill level of a large pit (Fosse 1 - St. 2) cut into the natural substrate and sloping steeply to the southwest (US 1006) (Figure 5.B, C). Several circular depressions on the surface of US 1006 may correspond to postholes. The creation of St. 2 may be contemporary with a second hollow structure (Fosse 2, US 1008 a - St. 3) located behind the former but which was identified only on the western side of the test survey. The detection of several episodes of filling already allows to partially reconstitute the formation process of these structures. In fact, the sealing of St. 3 appears to be contemporary with a first filling of St. 2. Both structures are then totally or partially covered by a red clay layer containing few small iron slags (US 1007). St. 2 is then filled with iron slag blocks (Figure 5.C, D).

Open area excavations conducted in this sector yielded a wide range of archaeological remains and structures, complementing data from the adjacent test pit (Figure 5.B). Considering the important thickness of US 1001 at the bottom of Kpeta 2 (nearly 80 cm), excavations in this part of the mound were only continued up to row AB. Upper levels (US 1000, 1001 and 1002) contained a large quantity of material, probably originating from the upper parts of Kpeta 2: fragments of pottery, fauna, as well as a few ferrous alloy objects, pipe fragments and cowrie shells. The last two categories are of particular interest as they may bear witness of long-distance exchanges. Among them, cowrie shells undoubtedly stand as an emblematic remain of these ancient trade networks. Twelve of them were discovered in these recent levels. A preliminary analysis shows that eleven cowries belong to the species *Monetaria moneta*, compared with one *Monetaria annulus* uncovered in the surface US 1000 (Christie et al. 2019). While the latter were used extensively by European merchants trading on the coasts of Africa from the sixteenth century onwards, their only presence can hardly be considered as a reliable chronological marker (Haour and Christie 2019: 315). US 1000 and 1001 also yielded four pipe fragments. Although two elements with truncated cone-shaped bases are likely to have been produced locally, two others white-paste fragments were probably imported from Europe.

Extensive surveys also revealed two highly degraded portions of ceramic pavement (St. 1, US 2001 - St. 5, US 2003) at the top of US 1003. Their stratigraphic position was equivalent to the iron slag concentration forming the upper filling of St.1. These degraded ceramic pavements, evoking the well-preserved architectural features identified in the upper part of the mound, are located on either side of a circular hearth approximately 13 cm in diameter and 10 cm deep (St. 4, US 2002) with a handstone and a lithic piece on its edges. Two probable postholes were also uncovered in the lower part of Area 3 (St. 6, US 2004 and St. 7, US 2007). All these structures were overlain by US 1001 and 1002, two major erosion layers containing large quantities of material coming from the upper parts of the mound.

Conclusion and perspectives

Preliminary results from the 2023 field season underline the great archaeological potential of Kpeta 2 for documenting the lifestyles of people living around the Gulf of Guinea between the medieval and modern periods. The spatial proximity and synchronicity of radiocarbon dates of

Kpeta 2 with nearby metallurgical sites such as Kpeta 1 also suggest that this settlement may have been occupied by ancient blacksmiths. The omnipresence of iron slags on this site, sometimes employed to make up architectural structures, could be another clue for such an interpretation.

Moreover, the good preservation of ceramic pavements, hearths, external floors and concentrations of furniture (pottery, macro-lithic tools) allows to apprehend with great precision spaces that seem to correspond to domestic spaces. The presence of one or more funerary structures and perhaps ritual deposits nonetheless raises questions about the function(s) of this site: could Kpeta 2 be considered as a settlement in which were integrated funerary or ritual structures? Such an association between the living and the dead would not be surprising in a region where it is not uncommon to bury some deceased under a room floor or in the courtyard of a compound (Haour 2019), and to integrate ritual altars into domestic spaces (see Sewane 2003, 2004; Insoll et al. 2013).

Future research at Kpeta 2 will aim to explore these aspects in greater detail, as well as the spatial organization of the occupation and its chronological extension. This latter point should shortly benefit from results of radiocarbon dating carried out on samples collected during the campaign 2023. From a methodological point of view, the acquisition of such an archaeological documentation is only possible by conducting large open-air excavations. Future research will therefore focus on extending excavation areas, particularly at the top of the mound, in order to gain a better understanding of the extent and structuration of the upper levels of occupation corresponding to the paved areas. In this sector, a geo-archaeological study will need to verify the hypothesis of prepared and maintained outside living floors. A similar approach could be extended on the slopes and in the lower part of the mound to verify the extent of the recent occupation, as well as the form and function of earlier structures.

From ceramics to macro-lithic tools, from faunal remains to metallic objects, the detailed study of the Kpeta 2 material culture will also stand as a major challenge of our research over the coming years. Beyond their own characteristics, some of these items bear witness to exogenous relations, enabling to assess more precisely the impact on African societies of the development of trade relations with European merchants from the sixteenth century onwards. Other elements, such as funerary and ritual practices, could allow to trace back cultural beliefs whose historical depth is still difficult to apprehend.

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Figures captions

Figure 1 - Location of Kpeta 2 settlement among the cluster of archaeometallurgical and domestic sites identified in the departement of Azovè (Southern Benin) in the frame of the AFRICA project (A), and detail on areas excavated in 2023 (B) (GIS and topography: C. Mangier-Merceron).

Figure 2 - Plan of archaeological structures excavated on top of Kpeta 2 at the end of the 2023 campaign. The two red oval-shaped forms represent the estimated extension of ceramic pavements St. 1 and St. 2 (Drawings and CAD: A. Delvoye and C. Mangier-Merceron).

Figure 3 - Extension of ceramic pavement St. 1 (A, B) and detail on its degraded parts (C). The edges of its eastern side appear slightly higher than the interior, just above the external rubbed ground (D), and reveals postholes (D) (Photographs: A. Delvoye).

Figure 4 - General view of the northern sector (A) where a concentration of grinders and pottery (St. 8) (B) have been found between ceramic pavement St. 1 and the funerary stelae St. 9 (C) (Photographs: A. Delvoye).

Figure 5 - Stratigraphy recorded from the north-eastern test survey (A, B), revealing the presence of a large depression (Fosse 1) filled with iron slags (C, D) (Drawings, CAD and photographs: A. Delvoye and C. Mangier-Merceron).