Excavation 2016 and XRF Analysis at the Nok Site of Ido in Central Nigeria

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Introduction

The Nok Culture has been known since the first half of the 20th century, when Bernard Fagg discovered the famous and sophisticated terracotta figurines (Fagg 1945, Fagg 1990). In 2005, the research resumed in the context of the Nok project led by the Goethe University and funded by the German Research Foundation [DFG]. The project aimed to address chronology, settlement patterns, regional diversity, material culture, and the environment within the project’s key study area. We defined several site categories were (Breunig & Rupp 2016), among them the so-called “stone-pot-arrangements,” tentatively interpreted as graves and described by Rupp (2010: 70). Those consist of larger stones, complete vessels, and occasionally stone beads. At the 2009 excavation at Ido the team working at the site discovered one such feature that included stone beads, possibly part of a necklace (Fig. 1-1). During excavations at the sites of Pangwari and Kurmin Uwa, we found similar stone-pot features (Fig. 1-3 and 1-4), consisting of intentional arrangements of stones next to one or two vessels in an area otherwise devoid of finds.

Because the soil is highly acidic it dissolves any bones that may have been present and the artifacts are the only indication for the interpretation of the features as graves. Assuming that chemical traces of the body were preserved in the soil, its existence may be confirmed by XRF analysis, which is able to detect and measure the concentration of specific elements within a sample. By comparing the element concentration patterns of the samples it is possible to recognize soil anomalies (Wilson et al. 2008). However, soil samples need to be collected in undisturbed stone-pot-arrangements. Because the Ido site was undisturbed it yielded these features and we conducted a new excavation in January 2016 to allow the collection of samples appropriate for XRF analysis.

Excavations 2009 & 2016

Ido is located in the center of the project’s key study area, on the south-west of Kaduna State. The first excavation took place in 2009 with a 10 m x 13 m trench that reached a depth of approximately 2 m below the surface. In the north section of the trench the research team identified several features, including stone concentrations, two pits and concentration of finds (Fig. 2). Some stone concentrations, including grinding stones, appear to have been intentionally arranged, while others might be natural accumulations. The soil was mostly devoid of finds, with the exception of the concentrations mentioned above and two pits characterized by soil discoloration, containing potsherds, terracotta fragments, and charcoal. Those pits extended into the northern wall, suggesting the continuation of the site. The most remarkable find in the old trench was a stone-pot-arrangement (Feature 09-01), which included grinding stones, two vessels and several stone beads arranged as if on a string, possibly representing the remains of a grave (Rupp 2010).

In 2016, we extended the northern area of the 2009 trench. The new trench measured 8.5 m x 5 m and contained several features that strongly resembled the features in the 2009 trench. The two pits of the old excavation continued into the southern part of the new trench and we identified them by soil discolorations and concentrations of finds. In addition, the excavation yielded three concentrations of stones, including grinding stones, and two stone-pot-arrangements (Feature 16-02 and 16-09, Fig. 3-1 and 3-2). In this trench, we did not find stone beads, but close to the surface a stone with three parallel grooves occurred, which could have been used for polishing stone beads (Fig. 3-3). Another feature consisted of a stone accumulation with two large fragments of terracotta figurines and one vessel located under the terracotta fragments (Feature 16-03, Fig. 3-4).

Chronology

Results of the 2009 excavation at Ido date the first traces of occupation to the Early Nok phase, between 1400-1200 BCE, and supported by one 14C date and diag-
nostic potsherds (Franke 2017; all dates are calibrated to 2 sigma). A pit containing decorated potsherds and terracotta fragments was dated by two $^{14}$C dates that fall in the 9th century BCE. These dates suggest the use of the site during the early Middle Nok phase. One $^{14}$C date points to further occupational activities during the later Middle Nok phase, between 750-400 BCE.

New dates from the 2016 trench confirm the results from 2009. A $^{14}$C date and diagnostic potsherds support an Early Nok occupation, between 1400-1200 BCE. Three dates ranging between the late 13th and the

Figure 1: Sites with stone-pot-arrangements interpreted as burial features. Both in Ido (1) and Ifana (2) remains of stone beads occurred, in contrast to Pangwari (3) and Kurmin Uwa (4).
9th century BCE-- two from the pits and one from the terracotta accumulation-- seem to indicate continuous activities from Early to Middle Nok times. The area around the stone-pot-arrangements did not yield organic material that could be used for 14C dating, but its similarity to the Pangwari site may suggest a 9th or 8th century BCE date for the arrangements (Schmidt 2014; Franke 2017). Finally, a 14C date (26-129 CE) taken close to the surface shows more recent activities between, after the end of the Nok period.

**XRF sampling and first results**

We used XRF on more than 700 soil samples from the 2016 excavation to identify chemical traces of a body buried in the soil, and thus to conclude whether it had been used as a grave. This research would also help support the interpretation of other similar features as graves. Because interpretation relies on the comparison of relative element values for the XRF analysis, we have to sample in situ features as well as the surrounding soil. A 25 cm x 25 cm grid was overlaid on the trench and we collected soil samples at different depths to ensure the recovery of chemical traces of a decomposed body. The results presented in this article are based on the analysis of samples collected in the level that yielded the vessel in feature 16-02, as we assume that a body would have been lying at the same level as the vessel. Because bones consist mainly of Tricalcium phosphate (Ca$_3$(PO$_4$)$_2$), the presence of calcium and phosphorus is the most important for the identification of a body.

The XRF data shows a highly positive correlation of both elements next to the feature, supporting the existence of a body (Fig. 4). However, further analysis has also shown positive correlations for manganese and...
strontium, as well as negative correlations for rubidium and potassium. These correlations were also identified in areas of the excavation without probable graves, raising questions about the origin of the compositional patterns. Upon a closer examination of both the photo documentation and the soil samples, I discovered that the element patterns with strong presence of manganese and strontium and negative correlation of rubidium and potassium match areas of weathered granite. The same occurred at feature 16-09, strongly suggesting that the correlation patterns can be explained by soil formation processes of weathered granite rather than by the presence of human

Figure 3: Features and finds from Ido 2016 showing stone-pot-arrangements (1 and 2), a grinding stone with three parallel grooves (3), and a head from the terracotta accumulation (4).
remains. Even if in this case XRF analysis did not confirm the presence of a body, it cannot be ruled out that the features were graves. It is possible that the chemical signal of a body may be concealed by the noise created by the weathered material. Another possibility is that the sampling grid size was still too large and the sample points may not have captured the chemical traces of the body.

If we consider these hypotheses, the existence of a body at this point in time can neither be verified nor disproved.

The results of this case study have shown the reliability of the method, which is currently being tested at other excavation sites with similar features in the context.

Figure 4: Ido trench 2016 with XRF results. Samples were taken from the level of the vessel of feature 16-02. Phosphorus and calcium correlate by high concentrations next to the feature, although further analysis have shown that it was not caused by the remains of a corpse.
of my PhD research.

Summary

Features consisting of stone-pot-arrangements occur at several Nok sites, raising questions about their purpose. Previous research has suggested that they are probably graves. I used XRF analysis at the Ido site to identify chemical traces of bodies buried in such features and detected anomalies in the composition of soil collected in the features, proving the potential of the method. However, the strong deviations observed could have been caused by soil formation processes that may have masked signatures resulting from the decomposition of a body. This problem can be solved by developing a filter for background noise (e.g. using an improved sample scheme). Excavations at Ifana, excavated in August 2016, yielded well-preserved stone-pot-arrangements and stone beads (Fig. 1-2), pointing to the existence of more graves. In this site, we collected samples using a denser grid of 10 cm x 10 cm without obvious natural features that may cause disturbances. This analysis is currently ongoing.

Although at Ido we could not conclusively identify the chemical signals of the presence of a body, the interpretation of the features as graves is still possible. Comparison with similar sites and the presence of stone beads, probably as part of necklaces, strengthen this work hypothesis. The use of different and complementary lines of research (including ethnoarchaeology, different sampling strategies and scientific methods) may allow a better and stronger interpretation of this type of sites as graves.

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