Ethiopia

Preliminary Survey of Archaeometallurgical sites in Hawzien, Northern Ethiopia

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Introduction

There is a lack of archaeological evidence for early iron production in much of the Horn of Africa, including Ethiopia. Little is known of the ancient technologies or craftspeople responsible for iron production in northern Ethiopia. The first archaeometallurgical research was initiated in 2016 by Humphris (2017) and focused on the investigation of two major iron production locations close to the town of Adigrat (Figure 1). Fragments of iron slag have also been noted at Gobo-Dura, Lalibella and Nechibet (Phillipson 1997).

Archaeological research at the ancient capital site of Aksum and other Aksumite sites has revealed a significant range of metal artifacts and tools that demonstrate the technological skills of metal workers in Aksumite societies (Munro-Hay 1991). Scholars like Finneran (2007) have suggested that even if there is insufficient archaeological evidence for metal smelting in Ethiopia, some of the metal artefacts discovered at Aksumite sites point to a local origin for technological development. However, Mapunda (1995) states that knowledge regarding the production of iron in the region is incomplete. Therefore, the archaeometallurgical research outlined here represents a particularly significant step forward in our understanding of ancient Ethiopian iron production.

The presence and absence of slag helps in understanding where in the landscape iron production was taking place. In Aksum and its vicinity, a number of archaeological investigations were undertaken by Phillipson in 1997. However, these large-scale investigations do not report significant quantities of metallurgical waste except at the site of Sibe'at in Adwa (Hagos 2011). Therefore, the possible geographical distribution of iron production was in the eastern part of Tigray (also supported by the results of the archaeometallurgical investigations recently conducted by Humphris (pers. comm). The forests of the area, as well as iron ore outcrops, may have contributed to this geographical distribution, while the distance from the major centers could have also been deliberate to keep the iron workers away from society.

Besides the presence of abundant evidence of iron slags, the rock hewn churches of Gheralta also demonstrate a requirement for hard tools such as iron picks. It is well known that the rock hewn churches were excavated using metal implements, and these metals could be produced locally by the local smiths in the area. Eighty percent of the rock hewn churches of Tigray are found in the Gheralta cluster mainly in the study area. Therefore, according to some scholars such as Humphris (pers. comm.), the abundant rock hewn churches in the region could be related to the abundance iron tools produced in the area. Yet scholars like Hagege (2000) ascertained that it is not known exactly when the churches were constructed. It is currently surmised that the churches in Gheralta undoubtedly dated back to the Aksumite period or the post-Aksumite period.

This study seeks to further fill this gap through investigations in Northern Ethiopia in the highlands of eastern Tigray in the Wereda of Hawzien. The iron production sites are found in the southern part of the Wereda, below the mountains of Gheralta, specifically in the area of Freweyni that is located about 18 km from the town of Hawzien. The majority of archaeometallurgical sites studied to date are located here at Selae and May-Tekli (see Figure 1).

Objective and methodology

The main objective of this study was to locate archaeometallurgical sites. More than two weeks of pedestrian survey were undertaken to document any visible archaeological evidence. Alongside this survey, the significance of our work was explained to local communities in an effort to raise awareness of their importance and the need for preservation. A total of seven archaeometallurgical sites identified during the survey are described below (Figure 2).

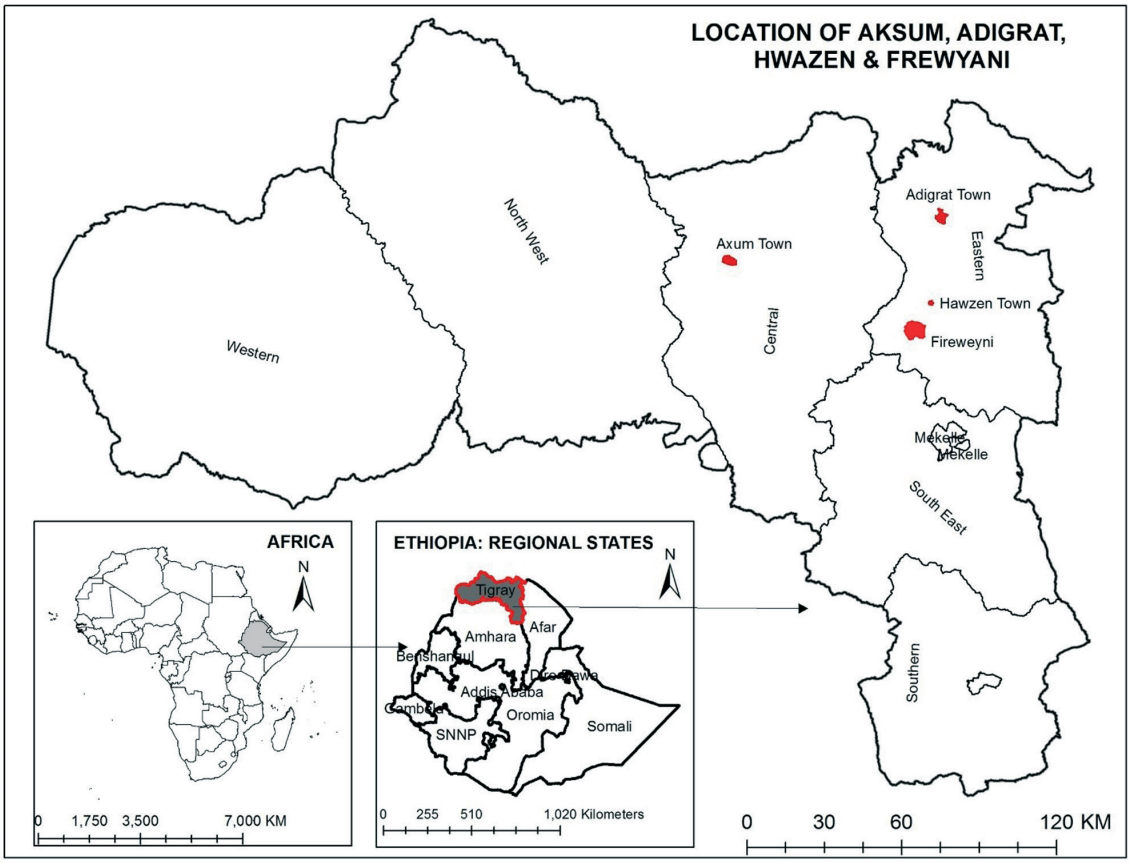

Figure 1: Map showing the location of Tigray in northern Ethiopia and of certain towns in the region (by Abrha Assefa, Adigrat University).

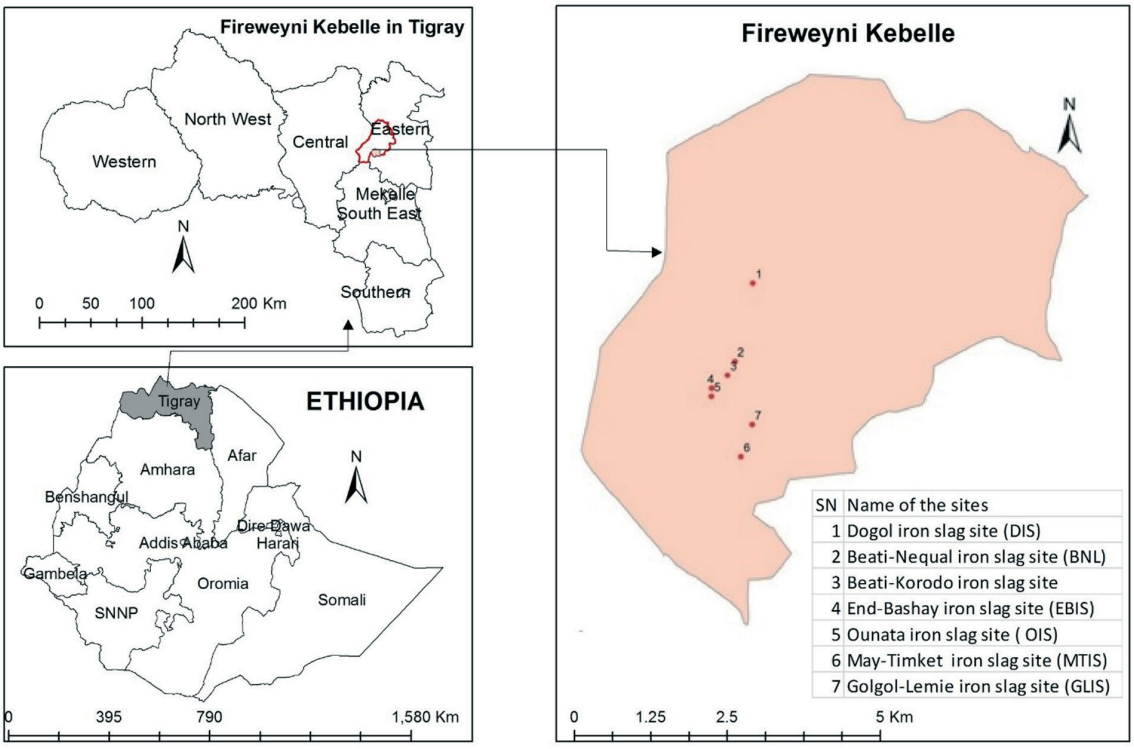

Figure 2: Map shows the identified sites of the study area (by Abrha Assefa, Adigrat University).

Figure 3: The site of Dogol (photo by Hailay Atsbha).

Dogol Iron Slag Site (DGL)

The site of Dogol is located 5 km north of the archaeological site of Bae'ti-Nequal and is almost one hectare in size. It is found at 0546931 easting and 1545430 northing with an elevation of 1983 masl. It is situated at the foot of the Gheralta Mountains, specifically the mountains of Mikael-Gundo and Enda Aba-Gerima, in a depression known as Dogol. Based on surface scatter, it is one of the largest iron production sites in the area. Significant quantities of slag ranging from small pieces of a few grams to larger pieces, is found scattered across the site along with furnace fragments. The site is known locally as Harea Hatsin (ሓርኢ ሓጺን), meaning 'a place where remains of iron slag or smelted iron are abundantly found'. The local inhabitants informed the author that in the 'ancient times' blacksmiths were smelting iron in the area, especially to produce agricultural tools. They also mentioned that the iron tools had been used during the construction of the rock hewn church of Mikael-Gundo which is found approximately 3 km northeast of the site.

The relatively remote location of this production site could indicate that the site's iron workers were isolated from the rest of the communities due to their powerful abilities to produce iron – a feature also seen elsewhere in Africa, at least in the ethnographic record (Finneran 2007). Alternatively, this relatively isolated location could have simply been particularly advantageous for accessing resources such as fuel and clay to construct the furnaces. Today, the site is vulnerable to erosion from seasonal rivers that run from the mountains, washing the sandy deposits downhill (Figure 3). This, coupled with human activity, has resulted in poor site preservation. Some archaeological materials seem to have been transported by water over 500 m from their original context, yet material including iron slag, unidentified bone fragments, grinding stones, and pottery fragments were found in and around this archaeological site.

The pottery found at this site, with incised horizontal lines with red orange colors are considered typical examples of the Aksumite period pottery. Scholars like Wilding (1989) have suggested that pottery fragments with horizontal corrugation and reddish-brown color with ledge rim basins are typically Red Aksumite ware. This Aksumite ware has a wide range of forms, shapes, decorations and motifs. Thus, based on the presence of similar decorations and colors, the pottery remains in the study area are tentatively dated to the Aksumite period (150 BC to 700 AD).

Recently, a number of radiocarbon analyses was completed on charcoal samples embedded within slag fragments at the site of Dogol (Table 1). The radiocarbon dates were funded by UCL Qatar as part of the wider investigations into iron production of the region being undertaken by Humphris. This revealed that the slag dated to the post-Aksumite period. The results indicate that a long-term iron production tradition existed in the region,

which demonstrates the potential of archaeometallurgical research to shed further light on the social and economic context of the post-Aksumite period.

AA number	Sample number	95% calibrated date
AA112052	DGL 1	1036 calAD to 1164 calAD
AA112053	DGL S2	1036 calAD to 1160 calAD
AA112054	DGL S3	898 calAD to 1019 calAD

Table 1: Radiocarbon dates obtained from charcoal samples taken from Dogol.

Finally, this appears from the surface to be one of the largest iron production sites in the area (Figure 4). A significant portion of the surface slag identified was found in a rock overhang. The slag fragments range from small (ca. 0.2 g) to larger (ca. 40 kg) fragments. There were no iron ore sources observed at the site. Thus, it is tentatively postulated here that the ore used for smelting was brought in from elsewhere. In order to confirm this hypothesis, a geological survey is required.

Figure 4: Iron slag and pottery fragments at the site (photo by Hailay Atsbha).

Bae'ti-Nequal Iron Slag Site (BNL)

Bae'ti-Nequal is located 5 km south of Dogol with 13513933 northing, 39205083 easting and elevation of 1967 masl. In the local language the term 'Bae'ti' means cave and 'Nequal' means hole. Therefore, Beati Nequal means 'hole cave'. Similar to Dogol, it is surrounded by mountains. Today the cave is used as shelter for the herders during the rainy season. Unlike the Dogol site, the archaeological features of this site are found in their primary context with little site disturbance observed. Pottery fragments, pounding holes, and possible sourcing ores are identified at the site. Consequently, the sourcing area for the ores is from the cave itself. Thanks to the use of a magnetic metal detector (helped by Humphris), the inside part of the cave was shown to be full of iron ore. As result, it is posited here that this may be where producers extracted iron ore that was processed in pounding areas for the region.

Various sizes of slag fragments are found scattered across the site in three main concentrations, but no charcoal or furnace fragments were noted. The three main areas of concentration of the site are 1) Bae'ti-Nequal One (BNL-1), 2) Bae'ti-Nequal Two (BNL-2), and 3) Bae'ti-Nequal Three (BNL-3).

Bae'ti-Nequal One (BNL-1)

This are is located below the cave south east of BNL-3 and south of BNL-2. Small slag fragments in large concentrations (Figure 5) and non-diagnostic pottery fragments were discovered. Since it is found in the shallow escarpment, the slag fragments from this area of the site were probably brought from in from the possible production area identified (BNL-3).

Figure 5: Iron slag at of BNL-1 (photo by Jane Humphris and Thomas Scheibner).

Bae'ti-Nequal Two (BNL-2)

This slag concentration is located north of BNL-1 and east of BNL-3. Around this area, fragments of pottery and iron slag were found alongside a chamber tomb with monolithic staircase, and hand axe like depictions. A well-dressed chair-like structure was carved in the stone directly above the tomb, and evidence of the traditional game 'Gebeta' is also visible, alongside graffiti such as a cross.

Bae'ti-Nequal Three (BNL-3)

This concentration is located west of BNL-1 and southeast of BNL-1 at the foot of the escarpment. In this area, large concentrations of various sizes of iron slag are evident, although no furnace is obvious. Interestingly, over 40 visible pounding hollows are present at the foot of the hill escarpment that were possibly used to crush ore mined from a visible seam running along the foot of the escarpment.

Bae'ti-Korodo Iron slag (BKIS)

This site is situated 5 km south of Dogol site, and 2 km south of Bae'ti Nequal site. Geographically, it is located below the hills of Korodo at 13513090 northing, 39204586 easting and at the elevation of 1965 masl. Unlike the archaeological sites of Dogol and Bae'ti-Nequal, half of the site is in arable land. Although a lot of slag is visible here, local people have also begun using the slag in house construction. Despite much destruction caused by human activity, furnace fragments and charcoal are visible alongside the slag fragments. Besides, pottery fragments with red and black colors are discovered. However, most of the pottery fragments in the site are undecorated. Of the diagnostic sherds with decorations, there are some with a hole and dot impressions. Others have cross-like decorations with reddish brown colors, incised vertical / horizontal lines with fired clay and grey/ black colors and horizontal line decorations with reddish brown colors. The majority of the diagnostic pottery sherds in the site have reddish brown colors with incised horizontal and vertical lines. Wilding (1989) stated that pottery sherds with such forms and decorations date from 150 AD to 700 AD.

Enda-Bashay iron slag site (EBIS)

This site is found near the rural road to Alal, approximately half a kilometer from the site of Bae'ti-Korodo, at 13512187 northing, 39203330 easting and at the elevation of 1960 masl. Pottery and iron slag was found in small concentrations across the site. There is a possible ore mine close to the site, although further investigations would be required to confirm this.

Unfortunately, a large portion of this site has been destroyed by agriculture and local road construction.

Ounatat Iron Slag Site (OIS)

Ounatat located to the southeast of Enda-Bashay and south of the archaeological site of Dogol at 13511640 northing, 39203626 easting and at the elevation of 1954 masl. In the local language the term 'Ounatat' (ዐናታት) means 'ruins of houses'. Slag concentrations can be seen on the arable land covering an area of around ¼ of a hectare and it has been used in recent house construction.

Most of the features (especially the iron slag) are found in their primary context. However, further geological or archaeometallurgical investigations are required to identify the iron ore source. Furnace material, embedded charcoal and pottery is also evident at the site, but due to local building and agricultural activity the site is at risk.

May-Timket Iron Slag Site (MTIS)

This site is found around 3 km south of the Ounatat (OIS) at 13503401 northing, 39205655 easting and at the elevation of 1907 masl. Like OIS, it is found in the plain area near private land. An area of the site referred to as 'May-Timket' meaning a place where baptizing is practiced using water, contains a scatter of slag but no additional visible material culture. The concentration of the slag is very small compared to the other sites. Since the site is located in a remote area, it might be that the producers chose it to escape from the general public and used it as a temporal production place. This could be the reason for the absence of other forms of material culture.

Golgol-Lemie Iron Slag Site (GLIS)

This site is found north of May-Timket and west of OIS approximately 4 km from Dogol at 13505659 northing, 39210496 easting and at the elevation of 1917 masl. Geographically, it is located near the river streams of Eimblo and Endakahanat at the place called Golgol-Lemie. In the local language the term 'Golgol' means field and 'Lemie' means green area; this is an appropriate name even now for this green landscape. Possible pounding hollows and furnaces are present alongside iron slag and charcoal. In addition to these discoveries, broken grinding stone with mano (a small stone used to make grinding stone rough) and pottery fragments have been found. Unfortunately, a stream is destroying part of the site.

Conclusions

In general, many of the sites are deteriorating due to environmental and human factors. As a result, their current state of preservation is poor, especially the sites of BKIS, EBIS, OIS and GLIS. The majority of the sites are located between mountains and close to rivers or streams,

and are hidden in isolated locations such as depressions in the landscape, or on mountain escarpments, possibly indicative of the often-marginalized position of iron producers in society (Finneran 2007). Whether it was only iron workers who occupied the region (settling in relation to the smelting sites) and if the pottery was produced locally is unknown.

To conclude, the survey in the Wereda of Hawzien resulted in the discovery of seven iron production sites, with archaeological evidence of iron slag, some furnace fragments, possible ore sources and ore processing locations such as pounding hollows. This demonstrates that the eastern region of Tigray has a significant metallurgical history. This is supported by the presence of many rock hewn churches in the cluster, which could indicate that the beginning of iron ore production in the area was during the Aksumite times.

One promising line of inquiry for reconstructing the history of iron working, the documentation and interpretation of contemporary traditions, has yet to be pursued. Although many of these traditions are still practiced throughout much of Ethiopia, most of them are in decline, and there is a pressing need for documentation. Valuable information such as the vocabularies of technical terms, the names of objects, and oral histories concerning fabrication and use of iron tools should be urgently prioritized by academics before this knowledge is lost. A thorough interpretation of these metalworking traditions will require the study of technology and the contexts of use, and a detailed investigation of the social status and the role of iron producers in the societies. Studying the iron working traditions of Ethiopia can serve as an excellent vehicle for exploring questions concerning the meeting of cultures in Ethiopia, which has been a crossroads for centuries.

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