TANZANIA

Archaeological Field Research in Njombe, Tanzania

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Introduction

This report is based on field research conducted at Njombe, southern Tanzania (Figure 1). The field research focused on investigating the bio-metallurgy of Bena ironworking and excavating Nundu iron smithing site. The results for this study indicate that while Bena iron workers were species-selective during iron working and that Nundu is an incontrovertibly smithing site in the southern highlands of Tanzania.

Background Information of Bena People

The name "Bena" is applied to present-day Njombe administrative district (Figure 1) situated on the high plateau of the southern highlands of Tanzania in Iringa Region. It is also the name of both the land (Ubena) and the people (Wabena) inhabiting it. According to informants, the name originates from a founding father by that name hence a tendency for a few clans, including the Manga, Mtende and Kahemela of Ikilavugi, to identify them with that name. Others, especially those living in Ikilavugi, Usovi and Nyikolwe, believe that the name derives from either hubena- to reap finger millet, referring to the people as Vabena vuledzi or that it derives from the practice of panning salt (Nyagava 1988). It was only in the 19th century (or probably known earlier to the Arabs) that the name was applied to all present-day Bena. Before that, the land and the people were known by names of the areas in which they lived or by the names of clan leaders. Whatever may be its origin the name is now applied to present-day Bena, an agricultural Bantu-speaking people who live in Njombe district but who also spill over into other neighbouring districts of Mahenge and Rudewa.

Nyagava (1988:41) writes that there were three stages of ethnic formation in Ubena. The first constituted the broad pre-Bantu period up to about 1100; the second stage of ethnic formation began with the process of absorption and cultural interchange between the pre-Bantu and the incoming Bantu-speaking people, and the third began in the seventeenth century to which most of the genealogies take us to (*ibid.*). Related to the cultural interchange was to the agricultural adaptability, which enhanced settlement of earlier communities leading to development of techniques and activities appropriate to a fully sedentary life (Nyagava 1988). The production of iron was a common practice among the people of Iringa as well as a prominent craft, which revolutionalized agriculture in terms of iron tools for more productivity (see also Lyaya 2007). Iron technology declined there in the early twentieth century due to, among other factors, the importation of manufactured iron tools and use of scrap iron (Mapunda 2002).

The history of the Bena throughout the second half of the 19th century and part of the 20th century is a history of foreign domination. According to Nyagava (1988), Bena resisted domination by both the Hehe and Sangu to the extent that the Hehe incorporated them into their military organization forming the Vanamwani regiment of the Hehe army. When the Germans intervened from about 1898 onwards, the Bena didn't acquiesce either. Although they resisted, Germans lastly managed to conquer them (*ibid.*). What happens after the German conquest demonstrated the Bena's ability to adapt to new conditions. The Bena modified their lifestyles and entered the labor market to become migrant laborers in the plantations established after the German conquest of the whole country (Nyagava 1988:45).

Bio-metallurgical Studies in Africa

Bio-metallurgy is the study of the biological species, both plants and animals, which were part and parcel of archaeometallurgy. Research, and hence literature, on the subject of bio-metallurgy *per se* is virtually non-existent. Researchers simply mention the use of organic materials but very rarely, if at all, attempt to explain the properties of the given species and account for their selection. Such studies are

Figure 1. Map of research area.

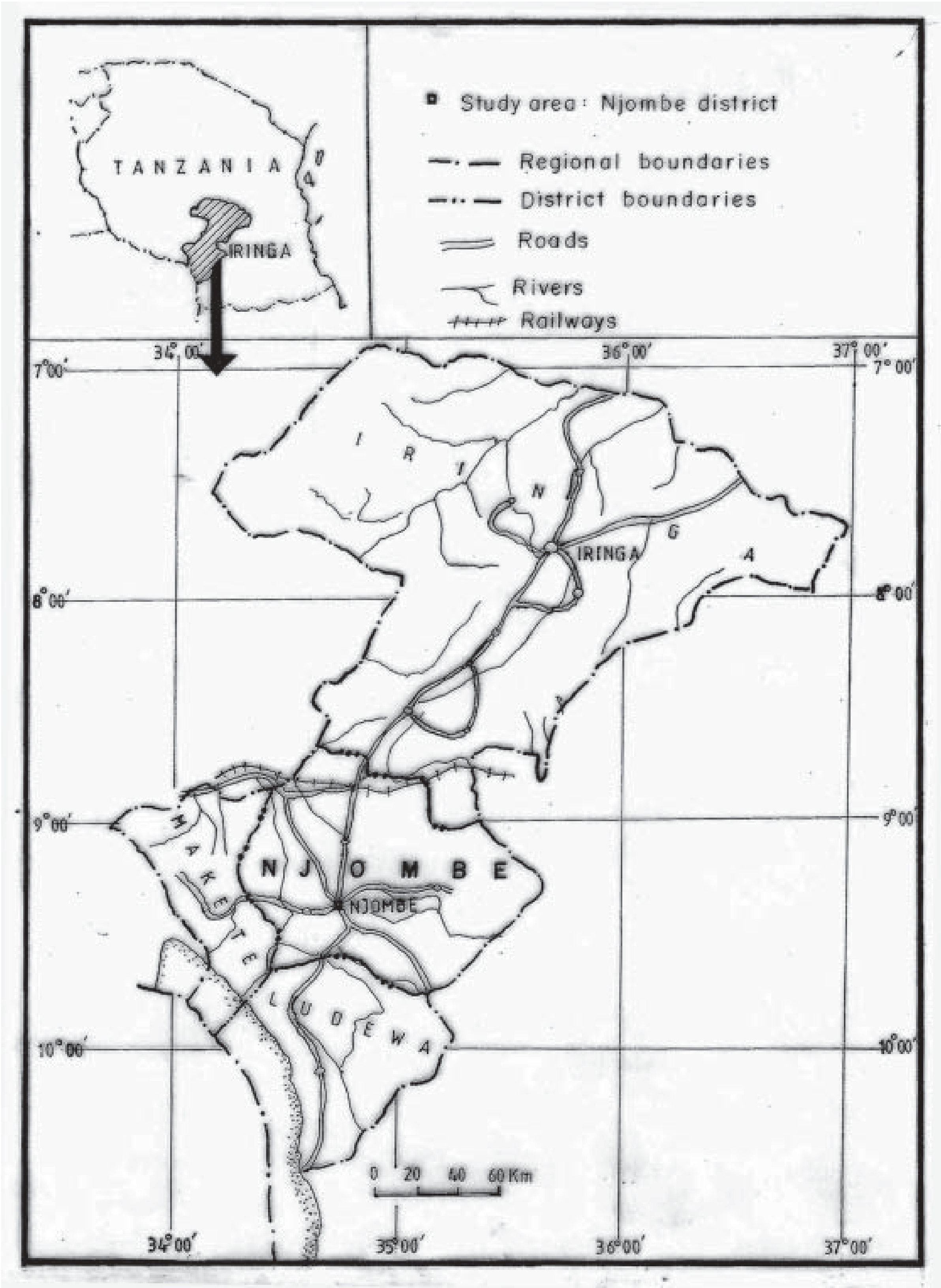
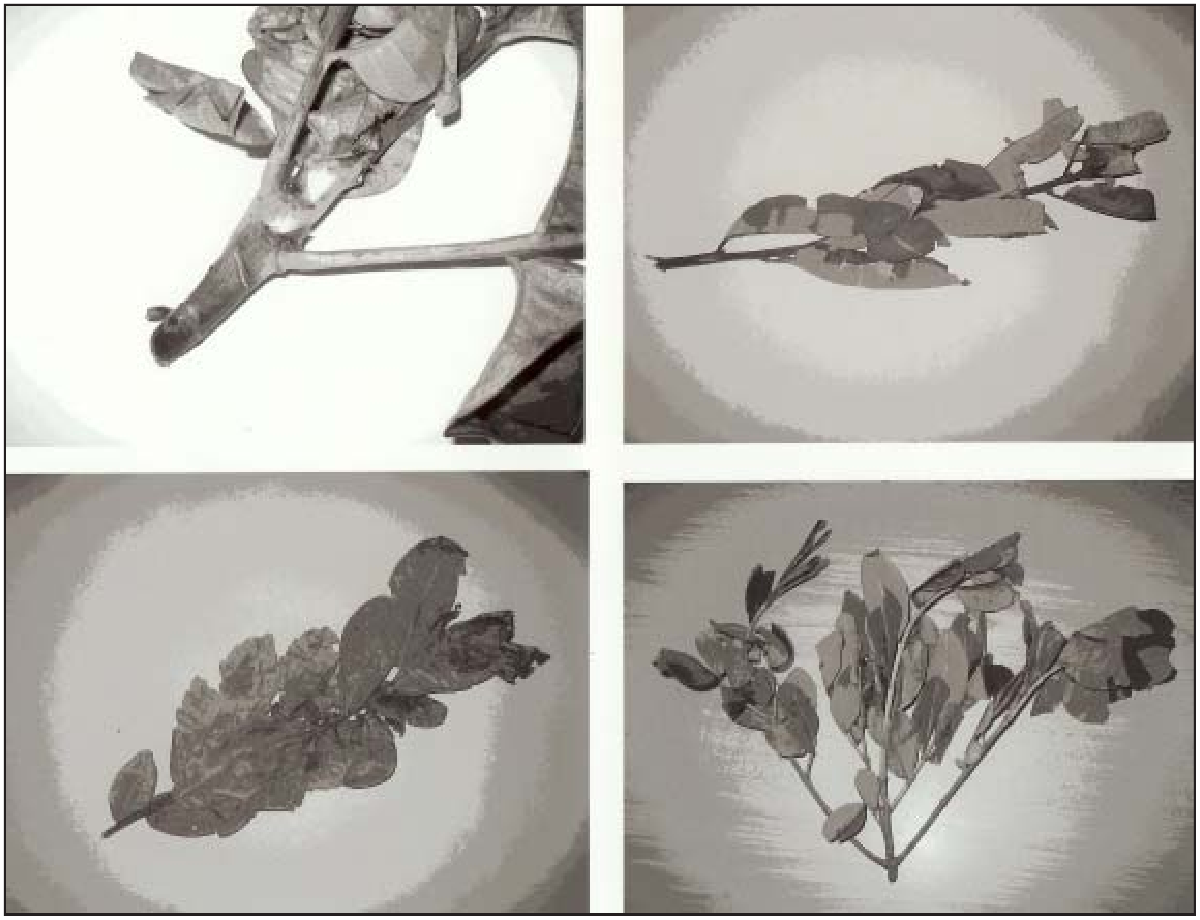


Figure 2. Top left: leaders of villages; top right: iron workers (men on right), bottom left: Ligema tree, bottom right: Libadzamona tree.

grouped into three. First, group writers who mentioned the use of charcoal for iron technology leaving out the tree species selected for making charcoal (e.g. Malcolm 1924; Todd and Charles 1978; Jensen 1997; Ackerman and Killick 1999; Rehder 1999). Second, groups mentioning the use of ritualistic medicines including their respective names (e.g. Brelsford 1949; Brock 1963; Phillipson 1968). For instance, while the Fipa used *ingailo* medicine made from barks of various trees, the Pangwa used *ing'anzo* medicine as furnace guardian (Barndon 2004). Thirdly, writers who identify tree and plant species used for charcoal and ritualistic medicines (e.g Avery and Schimdt 1979; Avery et al. 1988; David et al. 1989; Juleff 1996; Childs 2000). This group provides the reasons for the selection of the species as well as the useful charcoal for smelting and smithing. For instance, while Childs (2000) writes that *Albizzia grandibracteata and Sapium ellipticum* were used because of being very hard wood and do not get used quickly, David et al. (1989) attribute calorific power and fluxing effect as reasons for the selection of species such as *Piliostigma thonningii, Burkea africana, Acacia polyacantha* and *Tamarindus indica* among Mafa iron smelters. Also, while Rangi traditional ironworkers selected *Acacia nilotica, Rhus natelensis, Acacia millifora,* and *Acacia xanthophloea* for smelting charcoal, in the same society *Albizi amara* was specifically selected for smithing charcoal (Wise 1937, Mapunda 2003, Barndon 2004). Lastly, writers claim that because the quantity of wood needed in the smelting was considerably bulky (Van Noten and Raymaekers 1988) coupled with agriculture and the subsequent laterization of the exposed soil (Avery and Schmidt 1979), iron working technology may have led to deforestation (Schmidt 1997). While deforestation is said to be due to overexploitation and omnivorous exploitation (*ibid.*), Mapunda (2003) suspects that it is an overgeneralization and wonders why should iron working cause deforestation when

Figure 3. Top left: Libadzamona tree, top right: Lakalati tree, bottom left: Lifukwa tree, bottom right: Likenza tree.



only a handful tree species were harvested for charcoal? He concludes that in many places in Africa indigenous iron technology did not have a direct severe impact upon deforestation because iron smelters were species selective (ibid.).

Unfortunately, ethnoarchaeological works on bio-metallurgy of iron working in Tanzania have not focused on the Bena despite their ironworkers being famous just like Pangwa, Matengo, Ngoni and Fipa of the southern highlands of Tanzania. This is an academic gap, which this study aimed at solving through identifying flora and faunal species for archaeometallurgy as well as deciphering technical and socially-related reasons for species selection.

Metallurgical Research in Njombe

This field research had two objectives namely to identify the bio-metallurgy of traditional Bena ironworkers, and to excavate the Nundu smithing site. While the former aimed at identifying tree and plant species used for iron technology as well as the reasons for their selection, the latter focused on knowing how metallurgically significant was the site.

With the assistance of leaders of village governments (Figure 2, top left) we managed gathering seven elderly ironworkers (Figure 2, top right) and hold a meeting with them for the whole day at Mjimwema ward's offices. The meeting aimed at identifying plant species used for charcoal production as

Figure 4. Top left: Lilongo tree, top right: Ng’anzo medicinal plant, bottom left: Liwono / Mono medicinal plant Bottom right: Unit 1 floor.

well as medicines, and to choose a day for bringing and photographing such samples. It was possible after the interview to list all trees and plants for iron technology in Ubena including reasons for their selection. On 13th July 2008, samples were brought to the office and photographed as presented below (Figures 2, 3, and 4). They include *Likalati* (*Burkea africana*), Ligema, Libadzamono, Likufwa, Likenza, Lilingo, Ng’anzo, and Liwono species.

Excavation of the Nundu Site

This site was discovered by this author in September 2006. It is a smithing site located about 150m southwest of Msete site (Lyaya 2007). It is separated from Msete by Ngengedu River. It is located at a hill top at an elevation of 1840 metres above mean sea level, latitude 09˚22’26.5'” S and longitude 034˚50’00.8” E. It measures $609m^2$. One excavation unit (Unit 1) was established at the site. Oriented north-south, the Unit measured 1m by 1m and was established at 1.14m northwest of the datum point. The excavation was aimed at establishing the chronology of the site. The South-East corner was taken as a Sub-Datum Point (SDP) of the unit. Excavation proceeded by 5 cm levels because of large quantities of smithing slag. Excavation tools included trowels, five bar magnets for collection scale and droplet slag through attraction, a spirit level, a tape measure, pangas, sieves of two different sizes of 1 and 5 mm respectively, and shovels. Excavation was accomplished within five days when a sterile layer was reached.

Materials retrieved included slag of different shapes, charcoal, iron, and tuyeres. While detailed

Table 1. Material Count from Nundu.

Level (cm)	Scale slag	Droplet slag	Conglo. slag	Amorphous slag	Charcoal	Tuyeres	Fe
1 (0-5)	63,620	295	301	420	45	40	-
2 (5-10)	135,360	700		1140	800	65	18
3 (10-15)	169,200	?	75	1428	10	22	-
4 (15-20)	101,520	242	290	480	5	16	-
5 (20-25)	47,500	145	310	230	6	9	-
6 (25-30)	45,120	57	300	117	8	11	-
7 (30-35)	43,340	40	232	203	8	-	-
8 (35-40)	18,800	25	140	137	10	-	-
9 (40-45)	940	-	-	42	12	-	-
10 (45-50)	-	-	-	790	-	-	-
Total	625,400	1504	1648	4987	904	163	18

physical attribute and microscopic analyses are reserved for the future, in the field material were counted and weighed (Tables 1 and 2) and bagged. At the end of this activity, soil profile of northern wall (most representative wall) was drawn. Photograph of the floor plan was taken (Figure 4, bottom right). Lastly, backfilling was done when every material had been recorded.

Discussion

This study of the bio-metallurgy of Bena ironworkers comes up with very interesting and useful results for discussing issues at steak linking traditional iron working in Africa and environmental issues. Writers have accused ironworkers of having caused deforestation and the resulting soil erosion and degradation. One useful approach to based on while judging whether the claim is a myth or reality, is to study ironworkers through bio-metallurgy on what type and quantity of wood for charcoal was consumed. This study based on preliminary analyses show that not every tree species was useful for the purpose of making charcoal and medicines for smelting technology. This is because out of thousand species, less than ten species were selected for traditional metallurgy. This indicates that Bena ironworkers were species selective and that Bena didn't practice omnivorous wood consumption for charcoal (e.g. Schmidt 1997) but went for trees with technical qualities and cultural relevance. Their choices for the plant species was based on certain qualities such as large and dense hard woods, ability to last long on fire, and strong to smelt iron. In addition, there are plants such as *Mkufwa* which came in because of being useful traditionally for medicines. They were used as medicines during iron production process because of the belief and association that since healed people, it could behave the same to iron production. Diseases cured by such plants included stomach aches, bleeding, and flesh wounds. Lastly, the use of medicinal plants was associated with nature of the plant itself in relation to iron smelting. For instance, *Mono* or *Liwono* was selected by Bena because of its slippery-nature to act as grease during iron smelting. Therefore, because ironworkers were species selective (see also Mapunda 2003), regardless of large quantities of wood needed for iron production, it is correct to argue that ironworking didn't have a direct link to deforestation. And so the claim for the link is not only an overgeneralization but also a myth than reality. It was used by colonialists to justify the importation of metal ware, which led to the decline of indigenous iron working in Tanzania as elsewhere in Africa (Lyaya 2005). If ironworkers are to be held responsible for deforestation at all then their

Table 2. Material Weight in grams from Nundu.

Level (cm)	Scale slag	Droplet slag	Conglo. slag	Amorphous slag	Charcoal	Tuyeres	Fe
1 (0-5)	985	50	2075	1699	8	400	-
2 (5-10)	2260	90	1203	1305	125	580	80
3 (10-15)	1688.4	25.2	22,780	554.3	11.5	159.1	-
4 (15-20)	1715	10	958	182	2	282	-
5 (20-25)	790	17	667	84	9.3	200.8	-
6 (25-30)	694	7	516	93.2	6.9	198.7	-
7 (30-35)	706	4.9	396.5	70	15	-	-
8 (35-40)	18800	7	187	43.5	18	-	-
9 (40-45)	16	?	-	77.8	-	-	-
10 (45-50)	-	-	-	215	30	-	-
Total							

contribution was an indirect one through supplying farm implements which may have been used to clear forests much faster than stone, wooden, or bone implements (Mapunda 2003). For the purposes of certainty, this similar research has to be conducted to the rest of the societies which practiced traditional iron working in Tanzania.

There are similar plant species in Bena which were used elsewhere by different societies of ironworkers in Tanzania. For instance, while *Burkea africana* was used by Bena, Warongo ironworkers from Kahama (de Rosemond 1943) and Ndamba of Ifakara, *Mkufwa* was used by Bena and Fipa of Sumbawanga (Barndon 2004). Because such species cross various ironworking zones, their selection it can be argued, was much more based on technical qualities such as hard wood and density rather than cultural relevance or similar ecology.

The discovery of ancient smithing sites is not an easy task because of the nature of such sites and remains. Normally a smithing site needs, among other criteria, evidences such as an anvil, hammers, smithing hearths, tuyeres, and typical droplet, scale, and conglomerated slag to qualify incontrovertible one. Nundu site was discovered and documented in 2006 (Lyaya 2007). The excavation of this site in this field season confirms its significance to the history of ironworking in Njombe. Preliminary results have revealed three anvils and hammers *in situ*, smithing hearth coupled with lots of charcoal pieces, and typical smithing slag (such as scale and droplet) in large quantities. And because it has all the criteria, Nundu becomes one of the incontrovertible smithing sites in Tanzania. The remaining work in the near future is test microscopically whether refining was done adjacent to the site or not. The decision to this normally bases on the amount of potash available in conglomerated slag. The need to test comes from the fact that writers tend to concentrate on smelting and smithing slag or processes (*ibid.)* leaving out refinery iron slag since not all smelted iron was refined, but all smelted iron was ultimately forged (Brock 1963; Davison and Mosley 1988).Lastly, the dating of collected charcoal samples in the near future will tell how old the site is.

Conclusion

The bio-metallurgy of Njombe shows that Bena ironworkers were species-selective. These choices were based on technical as well as cultural factors. The assumption and association of indigenous iron working in Africa with environmental degradation was a colonial tool for administration. And so it becomes more a myth than the reality. On the side of excavation of Nundu, one can conclude that Nundu has all criteria and it becomes listed one of a number of incontrovertible smithing sites from the southern highlands of Tanzania.

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