

Iron in Africa

General Overview

Advanced

Africa is rather large, and the smelting of iron took place there for at least 2500 years. "Iron in Africa" is thus not a topic that can be covered with some breadth and depth in just a few pages. I apologize right away for many major omissions and mistakes.

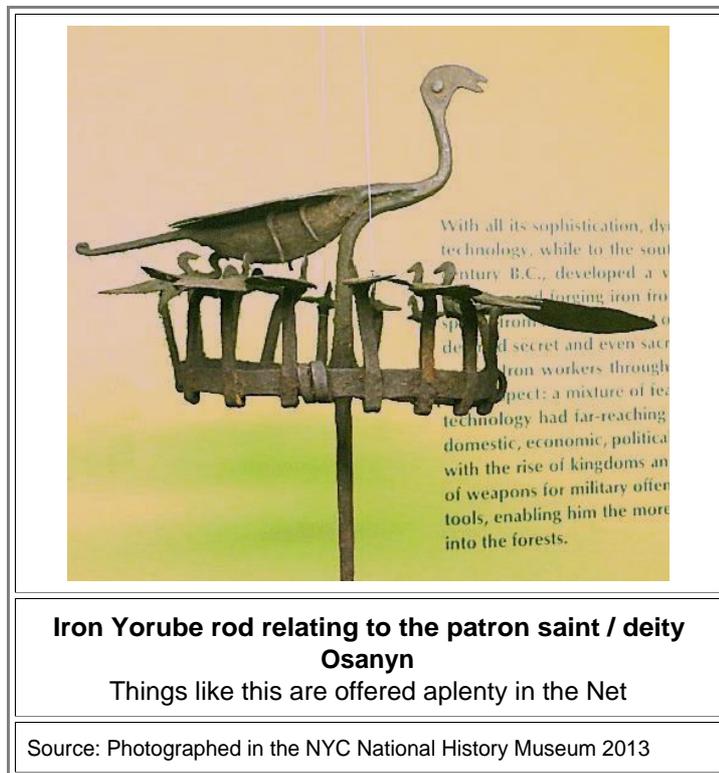
What we know is that some people in Africa smelted iron already in ancient times, like 500 BC or even earlier. They did that in primitive bloomeries, of course, like everybody else. That is not so amazing. The technology, if it wasn't invented independently, could easily have reached Northern Africa via the [Phoenicians](#) and the Meroitic regions (now Sudan) down the Nile from the [Hitittes](#) when they had invaded Egypt. I think we can actually be pretty sure that it had reached these areas, indeed.

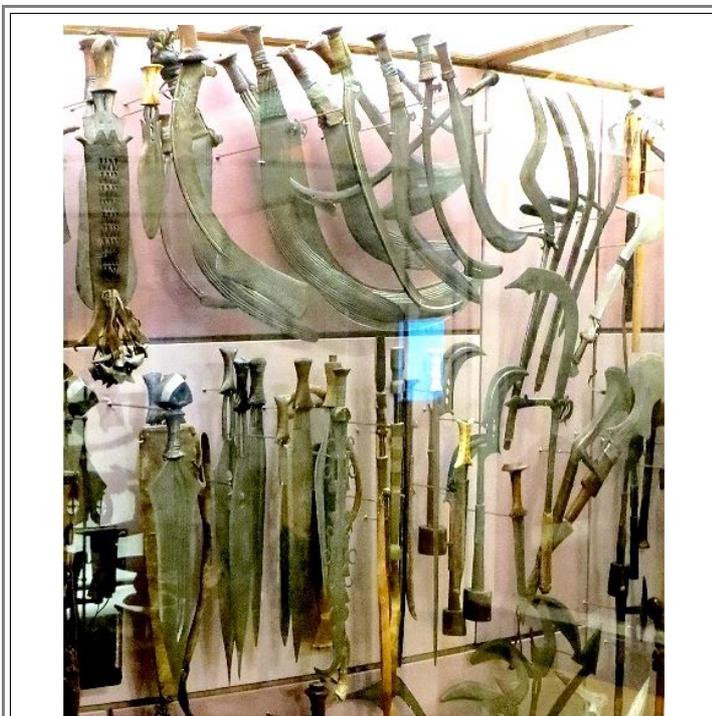
The amazing thing is that you probably can still find some people in Africa who could smelt some iron for you in a primitive bloomery. In some places they have never quite stopped doing this. It just kind of fizzled out in the last 100 years or so but the know-how is still around and can be used to please an archeometallurgist or just a curious (paying) tourist, I guess. I'll come back to this.

Serious smelting in bloomeries to meet people's needs and not to please tourists was still practiced in some places in Africa in the late 19th century. Sometimes this was watched and photographed by Western explorers. Some of the ancient tricks around iron technology, long since forgotten in the West, might have been recorded then. Nobody cared much about that for most of the time but the situation has changed since 1985, let's say. Papers to the general topic of "Iron in Africa" are coming in at a rapidly increasing rate since then and we might learn quite a bit about ancient iron making by looking at how people in Africa really did it.

Africa is big and what I mentioned above only covers a tiny bit of that continent. To make a long story short I just raise a few major points:

- Smelting happened all over the place in many cultures.
- The iron produced was mostly used for everyday items, farming implements, ritual things and for (simple) weapons.
- The level of sophistication was very low and far below of what is needed to produce for example a pattern-welded sword, a wootz blade or a Japanese katana.
- It is very difficult to find examples of early African iron. Almost all pictures found in the Net relate to commercial items, either without a date or 19th / 20th century. Items in museum are often not dated either or from more recent times. Here are examples:





A small part of the collection of African swords in the Copenhagen museum

Source: Photographed in the [Copenhagen museum](#)

- All the specimen above are in museums - and not dated. Plenty of similar stuff is up for sale in the Internet and either from the 20th century or not dated either. I doubt not that objects like these might have been made for hundreds of years - I just haven't seen a really old one yet.

Now let's look at some particular places / times. What follows is a highly subjective list. It simply indicates what I have found interesting in a limited time of searching around. I apologize for the misses and my personal bias.

■ **Kushite Kingdom in Nubia / Sudan**

The mighty Egyptians mostly dominated their neighbors in the south, the Kushites (Nubians) in what nowadays is the Sudan. Sometimes, however, it was the other way around. Kushite Kings ruled Egypt as Pharaohs of the Twenty-fifth dynasty for about a century (8th century BC) before they were kicked out again. The old Kushite capital Meroë is still well known for its pyramids.

- Later the Kushites (like the Egyptians) came under attack by Assyrians, Greeks, Romans (the land of Kush was famous for its gold) and learned early on to adopt the (iron) technologies of the Assyrians that were instrumental for loosing to them. In short, they went into iron smelting and iron forging in a major way. The earliest iron in Nubia dates to around 680 BC, indeed.

At least that is what one reads. The story is backed up by huge slag deposits found in the Kushite area.

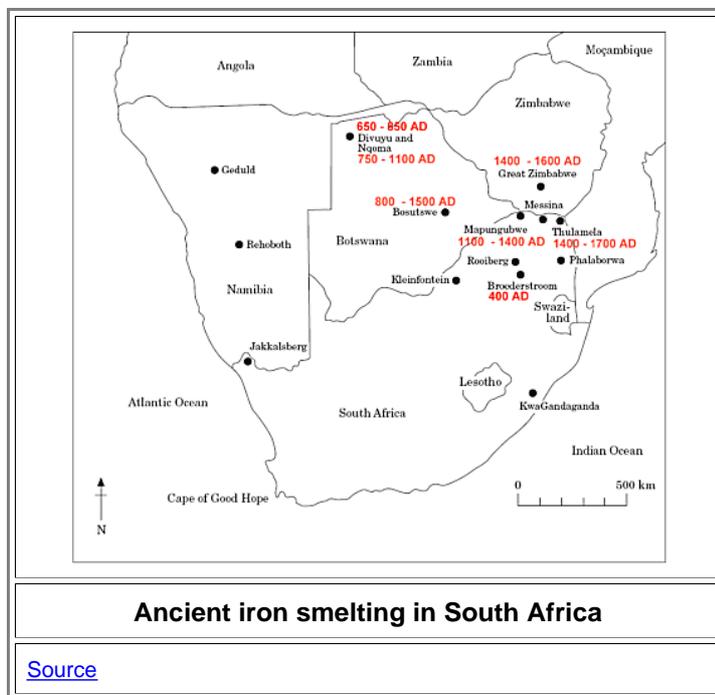
Purportedly the Kushites / Nubians made iron tips for spears and arrows, axes, hoes and so on but I have yet to see one of these objects.

It is reasonable to assume, as has been done above, that the technology "diffused" into the area and was not discovered independently. It is also reasonable to assume that it spread from there further south - but I don't know a thing about that.

■ **Southern Africa**

In Southern Africa (see map below) iron and copper appeared together in the first millennium AD, and that seems to be tied to a change in the life style from hunter / gatherers to sedentary agriculturalists. This in turn resulted from Ntu speaking people (formerly known as Bantu) moving into the area, replacing or displacing the "San" around 200 AD. Crops were now cultivated, domestic livestock was kept, people lived in semi-permanent villages, produced characteristic types of pottery, and smelted and forged iron

The map below gives an idea about the place; it also shows a few sites where iron smelting remains have been found, together with rough dates of their age. Most everything here is based on the [article of Duncan Miller](#).



The iron artifacts discovered are unremarkable; Miller offers no pictures but a lot of drawings. It is also clear that iron technology was known in the North, at times predating the oldest finds. According to Duncan Miller, the technology is characterized as follows:

- We still do not know if Early Iron Age (EIA) smelting took place routinely inside or outside villages.
- Iron smiths reworked the raw bloomery nodules in oxidizing, open forges. This hot working inadvertently lowered the initially high carbon content and softened the iron significantly, while distributing the remaining slag into elongated plates or stringers. This gave rise to characteristic compositional banding, which often weakened the structure because of cracking along slag inclusions.
- Objects made are mostly utilitarian (see picture).
- There was no systematic quenching and tempering.
- In Africa as a whole, and in southern Africa specifically, iron smelting furnaces varied considerably in design, both through time and from region to region, without any intelligible pattern.
- At least in the second millennium, iron smelting in southern Africa (as in most of the rest of the continent) was subject to a pervasive reproductive metaphor of **impregnation**, **gestation** and **parturition**, requiring various forms of seclusion and the observation of extensive rituals.



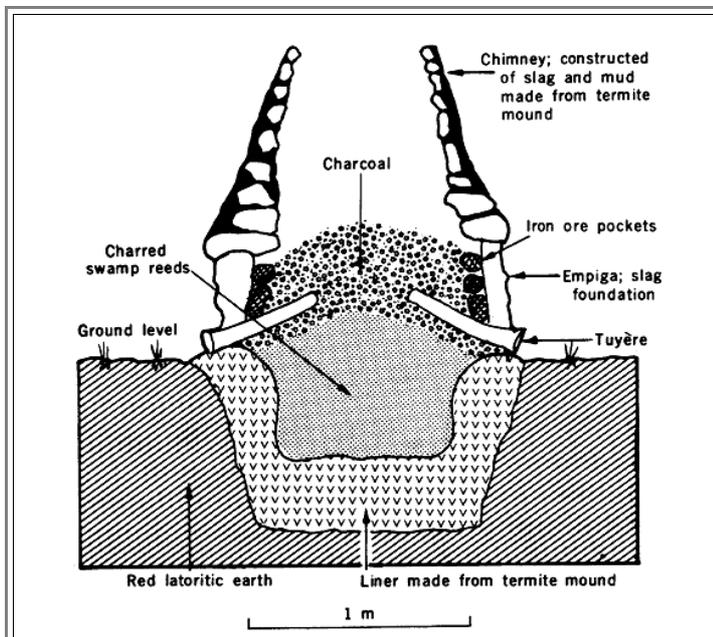
The last entry explains perhaps to some extent why African iron technology did not go very far: *It wasn't fun!* "Strict sexual abstinence was usually mandated for all male ironworkers and frequently for other metalworkers, during smelting and some stages of mining and smithing" write [Terry Childs and David Killick](#). Then they go on for a few more pages with stuff like this. Beer, indispensable for fun smelting, is never mentioned!

The Haya and iron smelting

[P. Schmidt and D. H. Avery](#) were some of these guys who induced elderly men to build and run a smelter for them. Dr. Schmidt then was an assistant professor of anthropology and Dr. Avery a professor of engineering at Brown University. The smelter was built in 1977 by some Haya, Bantu-speaking people, who live along the western shore of Lake Victoria, growing bananas, coffee and tea and doing some cattle herding. Here is the result:



Haya smelter in 1977. Note the 8 (leaky) tuyeres!



Haya smelter outline

[Source](#)

The smelter was drum-bellow blown by 8 people through 8 tuyeres and thus could not help to get rather hot. This simple prediction was confirmed by actual measurements. Schmidt and Avery claimed that iron was actually formed by precipitation inside the liquid slag but this is open to doubt, and so are the chemical reaction equations provided.

It seems that no bloom was produced but some high-carbon stuff in nodules. This is not surprising. One could have expected cast iron, in fact. The gist of the paper is to prove that African iron making was somehow superior to Western one because the air was pre-heated in the tuyeres. Some vague association to 2500 years of unbroken oral tradition link the 1977 experiment to old times.

Well. The guys above certainly could make some iron / steel / cast iron in their smelter, and so, no doubt, could their forebears. However, it was neither a particular remarkable technology (it is actually rather inefficient), nor did they do anything remarkable with the iron they produced. And that is most likely also true for their forebears.

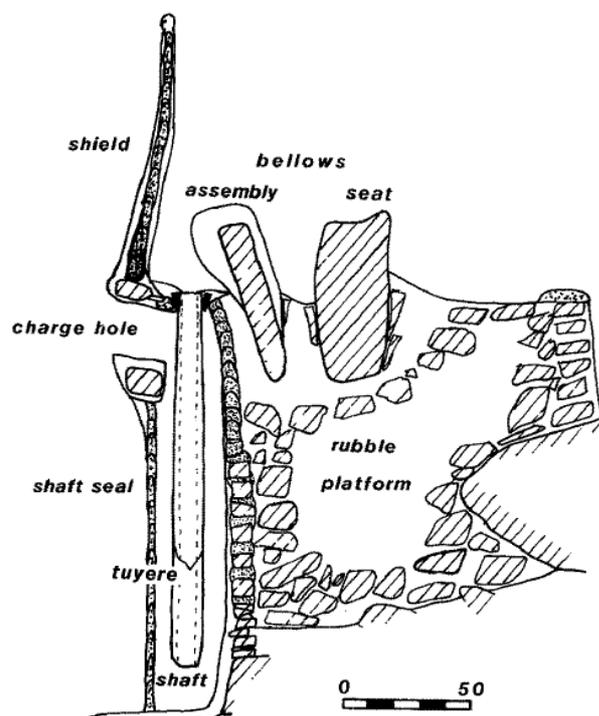
Mafa iron-smelting technology in North Cameroon

[N. David and colleagues](#) succeeded in convincing an elderly Mafa "iron master" to re-enact a traditional smelt in 1986. The Mafas (formerly called Matakam) reside in Cameroon and one of their (*unclean!*) casts has a monopoly on iron making and working. Their smelter is quite different from the one shown above but that seems to be true in a general way for all smelters in Africa. To quote Killick: "[students of African metallurgy have documented an amazing variety of processes, many with no known counterparts on other continents](#)", or: "[African ironworkers adapted the bloomery process to a wider variety of ores and invented a greater range of furnace designs than did bloomery ironworkers elsewhere in the Old World](#)".

- The Mafa smelter supplies the air from the top by a long tuyere and thus also utilizes some pre-heating of the air. Here is it:



The 1986 Mafa smelter



Mafa smelter schematic

- The 20 kg, 144 cm long single tuyere is a critical component. If it breaks the smelt is over and all the work and material wasted. The two bellows are primitive sheepskin pot bellows without valves. 82.3 kg of charcoal were used to process just 18.0 kg of ore in wildly fluctuating conditions "with the temperature rising and falling and the atmosphere varying between weakly and intensely reducing according to how hard the bellows were pumped and the ease of air flow to and through the vent at the base of the shaft".

Accordingly, a mediocre bloom consisting of everything from wrought iron to cast iron was produced.

- ▶ The authors try to give the impression that this was some special smelting with advanced features. It was not. If that was the best one could do in Cameroon in 1986, it stands to reason that the technology wasn't much more advanced in the 2000 plus years before that time.

Independent Discovery or Diffusion?

- ▶ For some reason that escapes me the answer to the question in the headline is a hot and emotional topic in archaeological and other circles. It appears that negating the "independent discovery" hypothesis is seen as discrimination against African people if not outright racism. This is a bit puzzling. The former inhabitants of Germany have definitely not invented iron making and many other important things but nobody today gives a damn about that as far as I can see.

- I do not have the faintest idea myself about the topic. Some African people somewhere might well have figured out how to smelt iron all be themselves; it is entirely possible. It is also possible that the know-how [diffused](#) "down" via the Phoenicians and via the Egyptians / Kushites.

Stanley B. Alpern as published a [recent review](#) on this question. While he admits that "the long-running debate over the origins of iron smelting in sub-Saharan Africa has been resolved... in favor of those advocating independent invention", he shows in a very detailed discussion that the question is actually still open. So be it.

- ▶ What strikes me as far more interesting is the fact that the Africans didn't do much with their iron steel. Nobody denies that. They made all kinds of useful stuff but did not evolve sophisticated iron / steel based technologies for making good swords (not to mention mail, armor, guns and battle ships). That is all to their credit. I by far prefer reasonably peaceful cultures to those engaged into an armament race.

- Nevertheless, African iron and steel technology is just not very interesting in the context of what I'm trying to do here. Just like the [Chinese iron & steel bit](#). And that of many other cultures that I never even mentioned. Sorry.

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- 1) Duncan Miller: "Smelter and Smith: Iron Age Metal Fabrication Technology in Southern Africa", Journal of Archaeological Science 29 (2002) p. 1083 – 1131; available online.
 - 2) Terry Childs and David Killick: "INDIGENOUS AFRICAN METALLURGY: NATURE AND CULTURES", Annu. Rev. Anthropol. 22 (1993). p. 317- 337
 - 3) P. Schmidt and D. H. Avery: "Complex Iron Smelting an Prehistoric Culture in Tanzania" Science, Volume 201, Number 4361 (1978) p. 1085 - 1089
 - 4) N. David, R. Heimann, D. Killick and M. Wayman: "Between bloomery and blast furnace: Mafa iron-smelting technology in North Cameroon", The African Archaeological Review, 7 (1989), pp. 183 - 208
 - 4) Stanley B. Alpern: "Did They or Didn't They Invent It? Iron in Sub-Saharan Africa", History in Africa, Volume 32 (2005) pp. 41 - 94