Ngangula, Pulungu and bellows workers[1]: the ironworkers according to Nova Oeiras' Royal Iron Factory data

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My research for the doctorate aims to analyse the life and working conditions of the people who lived in the village of Nova Oeiras, in the hinterland of Angola, especially those who worked with iron transformation in the Royal Iron Factory. This was located between the rivers Lucala, an important Cuanza affluent, and Luinha (in the actual Cuanza North province). Established by the governor Francisco Inocêncio de Souza Coutinho in 1766-7, it was part of his intent to increase and diversify the economy of the area dominated by the Portuguese.

On one hand, the factory installation was part of the Portuguese colonization project in Africa, and was related to mineralogical and scientific studies that were growing in the second half of the eighteenth century, in the context of Pombal's policies manufacturing development. On the other hand, it involved workers from a diverse cultural, social and legal matrix: Portuguese iron-working tradesmen and technicians, deported criminals from the metropolis, masters from Biscay, and African blacksmiths and smelters mobilized by fiat from neighbouring Angolan chiefdoms.

How this mosaic of individuals, which was united by their knowledge of iron smelting and forging, was related to the most important interests of the colonial and metropolitan authorities is my research aim. In this article, the study of African techniques that were employed in iron smelting and smithing will be used as a thread of analysis, since it allows us to understand the disputes, conflicts, customs and traditions involving both the Portuguese colonizers' strategies of domination, and the forms of resistance engaged in by Africans. Here, I wish to contribute to the studies about work in Central Africa and gain an understanding of the relationships between the traditions, customs and knowledge of Europeans and Africans.

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[1] Approximated translation for the expression used in the eighteenth century: "tocadores de foles".

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In December of 1766, the governor Francisco Inocêncio de Sousa Coutinho started construction on the Nova Oeiras Iron Factory, named after the then Count of Oeiras, and future Marquis of Pombal. Before that, the governor created the Village Nova Oeiras, in January 1767, located in the iron mines territory, in the conflux of the Lucala and Luinha rivers (affluent of the Kwanza river), in the current Kwanza North province. The Lucala is the biggest affluent of the Cuanza; it passes through the provinces of Uíge, Malanje and Kwanza Norte. The Luinha connects the towns of Cazengo and Golungo Alto.

The Iron Factory cannot be analysed as an isolated enterprise; contrariwise, we need to see it like a result of countless mineralogical studies in that region and the close observation of African techniques. The initial idea was to build two factories that afterwards would be united, when the Biscayan masters arrived – one of those in the village Novo Belém and other in the Luinha River, in Massangano Jurisdiction, in the village Nova Oeiras[3].

In December of 1768, the Quilamba Gongue Acamuccala, Antonio Pedro, reported to João Baines, General Steward of the Novo Belém Iron Factory, that he had 42 sons to offer for work. Among these, 12 were smelters, called "according to the regional language", *Pulungu*, two smiths and 28 bellows workers – who seem to be ironworker assistants[4]. In the same region, in the place called Cathari (Golungo Alto Jurisdiction), in 1800, Antonio Salinas de Benavides described African ironworkers that were supported by the work of women – who were the primary gatherers and farmworkers – while they would go to mines to smelt and smith the iron. The first ones were called *Pulungus* (sic) and the second ones *Gangulas* (sic)[5].

In these excerpts, we can identify the division of the ironworking occupation into three separate but interrelated specializations: smelting, smithing and bellows working. If the *sobas* separated their workers between smelters and smiths, would it be possible that one worker would combine both specializations? According to our data,

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[3] Gastão de Sousa Dias. *D. Francisco Inocêncio de Sousa Coutinho. Administração Pombalina em Angola*. Lisboa: Editorial Cosmos, 1936, p. 39. Letter from Francisco Inocêncio de Souza Coutinho, Governor of Angola, to Francisco Xavier de Mendonça Furtado. Luanda, 17th February 1767. Instituto Histórico Geográfico Brasileiro (IHGB) 126, Projeto Acervo Digital Angola Brasil (PADAB), DVD10,20 DSC00410.

[4] Letter from João Baines to Francisco Inocêncio de Sousa Coutinho. Novo Belém, 17th December 1768. Instituto de Estudos Brasileiros (IEB), Coleção Alberto Lamego (AL), Códice 83, Documento 203.

[5] Letter from Antonio Salinas de Benavides. São Paulo de Assunção de Luanda, 15th November 1800. In: Arquivos de Angola, v. IV, nº 52, 1939, p. 323.

we cannot assume, for this specific historical time and circumstance, that the occupation of ironworking was separated into the smelting and smithing processes. It is probable however, that they worked together in the same place, even the same workshop. This observation is important because the specialization patterns changed over time, according the workers choices and opportunities. As Collen Kriger has noted, "ironworkers that engaged in both smithing and smelting were not unspecialised but diversifying their operations"[6].

Reading documents about the Nova Oeiras Iron Factory, we can also recognize how ironworking occupation was named in this region and period. It was not possible to find, in Bantu languages dictionaries, one meaning for the word *pulungu* that relates to ironworking. It is important to say that ***pulungu*** is translated as "poor, wretched, a beggar"[7]. We could not find an explanation for this meaning and how it could be related with smelters – it is an open question. Nevertheless, Collen Kriger shows that in some Bemba oral testimonies the word *bashimalungu* was used to refer to "iron smelters". Words for "furnace" sharing this root (-*lungu*) were found in Lwena, Luba-Shaba, Hemba, Tabwa, Bemba and Fipa[8]. It would be a reasonable assumption that this is one of the explanations for this dictionary entry.

One the other hand, the word *ngangula* is largely translated in the dictionaries as "blacksmith, forger and manufacturer of iron goods'. We can find other words for blacksmith: *musuri, kateli, unsugula, muxiri, unguoxila ekete*[9]. It suggests multiple origins for knowledge of smithing practices in Bantu language societies like Central African History shows us.

In the seventeenth century, according to Cavazzi's reports, the Iron Factory region known as Ilamba Alta, or Lumbo, were full of rich iron ore mines and the principal soba was called Mubanga from N'Dongo king lineage. The author asserts that

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[6] Collen E. Kriger, *Pride of men. Ironworking in 19th century, West Central Africa*. Portsmouth, NH: Heinemann; Oxford: James Currey; Cape Town: David Philip, 1999, p. 9.

[7] Antonio da Silva Maia, *Dicionário complementar: português-kimbundu-kikongo*: (native languages of central and northern Angola), 1961. A. de Assis Júnior. *Dicionário Kimbundu-Português.* Luanda: Argente, Santos e Comp., Lda., [s.d.].

[8] "Lungu is also an ethnic term; the Lungu were among the several neighboring groups who supplied iron to Bemba communities in the nineteenth century, and some Lungu ironworkers immigrated into Bemba chiefdoms, paying tribute in hoes and adzes". Collen E. Kriger, *Pride of men. Ironworking in 19th century, West Central Africa*, p. 86.

[9] Ibidem.

the Africans recognized as their first king Ngola-Musuri meaning Blacksmith King[10]. The Antonio Gaeta narrative is from the same period and confirms Cavazzi's stories about the king of N'Dongo. He was said to be a blacksmith and that would explain why this occupation was synonymous with wealth and social prestige[11].

Antonio de Oliveira Cadornega also presents a narrative about the N'Dongo kingdom's foundation. The first king was a blacksmith called *gongolhas* (*ngangula* or the plural *jingangula*). The author guarantees that this was something about which nobody could doubt, because to be a smith, amongst that people, was a highly appreciated occupation[12].

These authors tell about smiths and a complex, already well-known, mystique that surrounded those who worked with smelted iron and the foundation of the Mbundu states. Nevertheless, the region was important because of the smelting techniques.

The territory of Nova Oeiras mines were localized, in the sixteenth century, next to the Lenge province, in the *ngola a kiluanje* capitals. According to Joseph Miller, the *ngola a kiluanje* subsequently would resist Portuguese advancement in this region because of their control of the iron mines. In addition, the origin of the *Ngola* authority name is indicated by the author in the plateau regions near to the Lucala river headspring. The Samba were the people that introduced the *jingola* – a insignia that was a symbol of authority and made from iron – in the Mbundu states (dwellers in this area). They were described in the Mbundu traditions, from the seventeenth century, as owners of a highly sophisticated iron technology[13].

The governor Francisco de Sousa Coutinho, in the second half of the eighteenth century, like his predecessors, was informed about all of this ironworking tradition (both smelting and smtihing). This is what we can see in his descriptions of the Africans who worked in the village that he christened Nova Oeiras. At the beginning of the governor's mineralogical experiences, in 1767, he wrote to the captain of the Ambaca Jurisdiction, for the recruiting of blacksmiths and "others that know how to smelt iron"

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[10] Giovanni Antonio Cavazzi de Montecúccolo, *Descrição Histórica dos Três Reinos, Congo, Matamba e Angola, Junta de Investigações do Ultramar*, Bibliografic introduction by F. Leite Faria, translation by Father Graciano Maria de Leguzzano Lisboa, 1965, vol. I, § 390.

[11] Antonio da Gaeta, *La meravigliosa conversione alla Santa Fede di Cristo della regina Singa e del suo regno di Matamba*, Nápoles: Francisco de Maria Gioia, 1669.

[12] Antonio de Oliveira de Cadornega, *História geral das guerras angolanas (1681)*. Anot, José Matias Delgado. - Lisboa: Divisão de Publicações e Biblioteca-Agência Geral das Colónias, 1940, vol. I, p. 56.

[13] Joseph C. Miller, *Kings and kinsmen: early Mbundu states in Angola*. (Oxford Studies in African Affairs.) Oxford: Clarendon Press, 1976, chapter 3.

for factory work. The Governor of Angola knew that ironworkers were important for the agriculture and slavery economy, so he asked for half of these workers; the rest would stay to produce and sell the hoes, *libambos*[14] and axes[15].

In his memoirs, the Angolan Governor pointed out that in that area there were "a lot of smelters and blacksmiths that with small forges and bellows made from goats' skin worked often in hoes, hatchets, *libambos* and others small goods"[16].

José Álvares Maciel wrote the most complete report about all the details that the iron smelting process involved in Nova Oeiras. He had visited this area at the end of the eighteenth century and was able to add more specific information to our knowledge of ironworking there. He was an important naturalist, graduated at the Coimbra Philosophy Faculty, with much experience in mineralogical studies, who had been accused of participating in the Minas Conspiracy; he was condemned and deported to Angola[17].

At this point we need to make some remarks on this naturalist group to which Maciel belonged. During the eighteenth century, European naturalists "planned to carry out a great inventory of nature and people, and therefore, roamed the seas and lands with teams of gardeners and artists". The wise in philosophical travel, "like economists and ethnographers," also aimed to collect "the native techniques for the transformation of nature".

Detailed descriptions of how naturalists catalogued nature, techniques and local populations can be found in the work of William Joel Simon, *Scientific expeditions in the Portuguese overseas territories (1783-1808).* With this study, we understand how, in Portugal, these trips were planned by the Paduan naturalist Domingos Vandelli (1735-1816), one of the first teachers recruited by the Crown to teach at the University of Coimbra and the College of Nobles with an important involvement at the Academy of Sciences. In addition, the teacher had considerable impact on generations of Portuguese and Brazilians naturalists. Among the students, Alexandre Rodrigues Ferreira, Manuel da Silva Galvão (both born in Bahia), Joaquim José da Silva (the Rio

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[14] *Libambo* was a chain tied to the neck of the slave.

[15] Letter of Francisco Matoso de Andrade. São Paulo de Assunção de Luanda, 4th January 1767. Biblioteca Nacional de Portugal, Códice 8742 (F6364), fl. 114v.

[16] Memoirs of Francisco Inocêncio de Sousa Coutinho. Lisbon, 16th September 1773. Biblioteca Municipal do Porto, Códice 437.

[17] Francisco Antonio Lopes, *Álvares Maciel no degredo de Angola*. Rio de Janeiro: Ministério da Educação e Cultura, Serviço de Documentação, 1958.

de Janeiro), João da Silva Feijó (the Rio de Janeiro) and Joaquim Veloso de Miranda (Vila Rica) distinguished themselves.

To plot their plans for the exploration of the natural productions of the colony, Vandelli appealed to the "protector of the sciences of Portugal during this period," Martinho de Melo e Castro (1761-1765). The then Secretary of the Navy and Overseas Secretary of Portugal who served key roles during the reign of D. José I and was a fundamental figure in the continuity of Pombaline policies of encouragement for philosophical travel in the reign of Queen Maria I. Thus we see how a Natural History of the Portuguese colonies develops, that made settlement plans and exploitation of natural resources in the overseas domains feasible. Mineralogical aspects of these territories were an important target of these studies.

This interest about African techniques was shared for travellers and Portuguese authorities. Manual Galvão, Vandelli disciple, in his trip to Moçambique, described what he heard about the Macúas methods to forge iron. According to him, the Macúas took a piece of iron ore and put it into the fire, they heats iron until the unwanted slags are hammered out and the portions of malleable iron become a coherent mass of metal.[18]

The memoirs, drawings and treaties made with the intention to know the overseas territories and exploit their natural resources enabled the planning and execution of the Nova Oeiras' Iron Factory project, which aimed to make Angola an iron-manufacturing centre for metal supply in the Kingdom and in the overseas territories. Furthermore, the observation of iron smelting and smithing methods by Africans, compared to processes developed in European factories, was fundamental for iron exploration in the village of Nova Oeiras.

Reading the "News of the Nova Oeiras Iron Factory from the Angolan Kingdom", written by José Álvares Maciel in 1797, we can understand how these mineralogical studies were elaborated. After some visits to the Iron Factory and local experiences with iron smelting, he identified the tools used by the African ironworkers

[18] Letter from Manoel Galvão Silva to Martino de Melo e Castro. Moçambique, 21 de agosto de 1785. AHU, Moçambique, Caixa 22. *Apud* William Joel Simon, *Scientific expeditions in the Portuguese overseas territories* (1783-1808). Lisboa: Instituto de Investigação Científica Tropical, 1983, p. 153.

and their knowledge about the smelting process[19]. Two pictures with legends were attached to this document; they describe two similar methods to smelt the iron ores.

Figure 1: *News from the Iron Factory of Nova Oeiras of the Kingdom of Angola*. São Paulo de Assunção de Luanda, 15th December, 1797 [p. 8].

[19] José Álvares Maciel, *Notícia da Fábrica de Ferro da Nova Oeiras do Reino de Angola*. São Paulo de Assunção de Luanda, 15th December, 1797. Arquivo Histórico do Tribunal de Contas (AHTC), Erário Régio (ER), 4196.

Description that follows Figure 1:

"A = This is the smelting furnace, where the iron in bars is placed. After it is smelted, is kept under charcoal.

B = This is the furnace wall with tile shards glued to it.

C = This is the smoke that comes out from holes in the walls.

D = This is the clay tube through which the bellows are blown.

F = This is the bellows leather.

G = These are the sticks with which the workers trigger the bellows.

This smelting process is fast, it would take around one hour". In: *Notícia da Fábrica de Ferro da Nova Oeiras do Reino de Angola*. São Paulo de Assunção de Luanda, 15 December, 1797 [p. 8].

Figure 2: *Notícia da Fábrica de Ferro da Nova Oeiras do Reino de Angola*. São Paulo de Assunção de Luanda, 15 December, 1797 [p. 9].

"A= This is the straw beam or 'mubu' (sic) that is placed in the middle of the furnace.

B= This is the iron ore covered by charcoal that is placed beside the charcoal. When it heats up, they introduce the clay tube. E = When it happens, they also trigger the bellows. F = Then they put the tube close to the iron ore. J= The iron ore from the stone is smelted.

C = This is the furnace wall with tile shards glued to it.

D = This is the smoke that comes out from holes in the walls.

G = This is the bellows leather.

H = These are the sticks with which the workers trigger the bellows.

This smelting process is performed from the stone of iron ore. I placed into it two arrobas of stone of iron ore and in four hours [illegible]".

In: *Notícia da Fábrica de Ferro da Nova Oeiras do Reino de Angola*. São Paulo de Assunção de Luanda, 15 December, 1797 [p. 9].

Maciel started with a description of the tools: the furnace was less than "one foot to one foot and a half" in diameter and eight inches in height. Its walls were made from small pieces of tile or pans and because of this were full of openings or holes.

The bellow had a wood tube and a "longa" (sic) made from clay that had to be the same length as the furnace diameter. This detail is explained: it had to be like that because the iron ore introduced had to have the same proportion as the iron metal smelted.

Bacelar Bebiano explained, in his studies about metallurgy in Angola, that the bellows wood tube were positioned to avoid diametrically opposed positions (how can we see in figures 1 and 2). This detail avoided the shock of air that could annul the smelting process[20].

After that, the naturalist described the way that the iron ore was carried into the furnace: at the beginning, that made a straw beam cylinder (with the same furnace diameter) called by the Africans "tábua". After placing charcoal stepped into the low furnace, they introduced the mined iron ore crushed with coarsely broken charcoal. Here there is an observation: the pieces of charcoal could not be large.

The next step was to dovetail the "longa" mouth to the straw beam cylinder. The iron was smelted in the furnace with the air blasted from the manual bellows. This operation could take one hour in the first picture and four in the second.

In modern times, we would describe these processes in other words. The smelting process turns iron ore into metal. During this, "chemical reactions take place between the ore and the fuel in a furnace at temperatures above the melting point of the metal involved."[21] Smelters produced iron in the solid state by reducing the iron at temperatures below the melting point of iron (1538º). The fuel used in the smelting furnace is usually charcoal. It does not only provide heat, but also combines with oxygen in the air blast to make carbon monoxide

> "...which in turn reduces iron oxides, producing iron metal and carbon dioxide. It is the carbon monoxide that is critical, for it provides a reducing atmosphere for smelting iron ore and, by limiting the amount of air supply to the furnace, smelters can create more carbon monoxide and thus a larger working area in the furnace. As the oxygen is reduced from the ore, other molecules of carbon may combine with the iron, and the lesser or greater

[20] José Bacelar Bebiano, *Notas sobre a siderurgia dos índigenas de Angola e de outras regiões africanas*. Lisboa: Museu do Dundo, Companhia de Diamantes de Angola, 1960, p. 28.

[21] Collen E. Kriger, *Pride of men. Ironworking in 19th century, West Central Africa*, p. 7.

> amounts of this combined carbon result in iron with different proprieties. Low carbon iron is soft and malleable; iron with moderate carbon content (steel) is durable and tough; very high carbon cast iron can be brittle and very difficult to forge. (…) Thus smelting in the solid state involves a delicate balancing of the important factors of air supply and temperature. If all goes well, the furnace will yield clumps or a mass of reduced iron at the end of the smelt. This iron is called a 'bloom', and it usually requires refining that is hammering out of trapped lumps of slag and charcoal"[22].

Governor Francisco de Sousa Coutinho compared this method to the Biscayan and considered that the only problem in this method of smelting iron was the amount. The considerable difference between the Biscayan method and the African was therefore the size of the bellows. Used in Europe they were larger and therefore allowed for an increase in the amount of production[23].

In April 1767, Francisco de Sousa Coutinho hired four smiths and smelters masters from the regions of Biscay and Navara, so that they might employ European ironworking methods. In November 1768, the masters arrived at Nova Oeiras after a five-and-a-half-month trip. After 16 days since their arrival, José Retoaça died, according to reports from the governor, a victim of scurvy and poor weather conditions in the region. The same causes led to the deaths of Francisco de Zuloaga, on 8 December, and Francisco de Chinique, on 29 December.

The governor in his letters mourned these losses because he was beginning to realize the failure of his resources in maintaining the factory going. The fact that José Manoel de Chevarria had survived was the means found by the governor to argue with the Overseas Secretary on the success that the factory might still have had. That was because this blacksmith was supposedly "the best in his art."[24] To the misfortune of the Governor, soon after, in January 1769, Joseph Chevarria also passed away, victim of a violent fever.

In 1772, at the end of the Sousa Coutinho government, the factory was finished, but had not been able to start its operation using European iron casting methods, which were more effective in terms of volume production The techniques employed to manufacture the iron during these years were the Africans.

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[22] Ibidem.

[23] "This same method is of the blacks in the country, and only differs in the quantities, by which cause, once they learn how to make large portions with larger bellows than their current, this considerably multiplies the yield of the factory." Letter to Francisco Xavier de Mendonça Furtado. São Paulo de Assunção de Luanda, 20th January 1769, IEB/AL - 082 -142.

[24] Ibidem.

Once appointed, the new governor, D. Antonio de Lencastre (1772-1779), ordered the closure of the iron factory and suspended the right of Sousa Coutinho to pay *jornais*[25] for workers. However, as shown by José Álvares Maciel's studies, interest in the exploitation of these mines is an issue that will not be forgotten any time soon by the Portuguese authorities.

In the late eighteenth century, it was the Africans who continued to smelt the ore and forge iron products in their own workshops, which would then be sold to the Royal Treasury. The naturalist Maciel alerted to the fact that teaching the *natives* and increasing the amount of metal in the foundry could be counterproductive, since the Africans would sell their iron bars and could then start their own businesses. The same concern was one of the governor Dom Miguel Antonio de Mello's, in 1797, who maintained that the Portuguese should recoup the iron from the Africans, just as they would recoup ivory and slaves. Undoubtedly, blacksmiths, smelters their assistants, and the bellows workers, were able to see profit-making opportunities in their respective trades[26].

For the study of the Nova Oeiras village, this incursion by the history of techniques leads to the meeting of narratives in which "the interactions and tensions between the social and the cultural are made manifest"[27]. In this sense, "techniques are inseparable from action/relations" and the material elements of culture are seen "as documents of social realities, not as reflections of these, but integrated into their construction"[28].

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[25] *Jornal* corresponds to the payment for one workday.

[26] José Álvares Maciel, *Notícia da Fábrica de Ferro da Nova Oeiras do Reino de Angola*, p. 6. Letter to Dom Rodrigo de Sousa Coutinho. São Paulo de Assunção de Luanda, 19th December 1797. In: Arquivos de Angola, v. IV, nº52, 1939, p. 260.

[27] Natalie Zemon Davis, "Las formas de la Historia Social", *História Social*, n.10, 1991, p.182.

[28] José Newton Coelho Meneses, "Apresentação", *Varia História*, v. 27, n. 46, 2001, p. 397-399.