DEPICTING THE INVISIBLE: THE CASE OF WELWITSCH'S AFRICAN MAP

SARA ALBUQUERQUE¹ and SILVIA FIGUEIRÔA²

¹*IHC - Instituto de História Contemporânea/Institute of Contemporary History, Research group: Science, History, Philosophy and Scientific Culture (CEHFCi), University of Évora
Palácio do Vimioso - Largo Marquês do Marialva, 8, 7000-554 Évora, Portugal
FCT Post-Doc Researcher (ref: SFRH/BPD/108236/2015)
sma@uevora.pt*

²*Faculty of Education, University of Campinas (UNICAMP), Campinas, Brazil
Av. Bertrand Russell, 801, 13083-865 Campinas-SP, Brazil
CNPq Researcher (Grant no. 308432/2013-4)
silviamf@unicamp.br*

ABSTRACT

This paper addresses a 19th century African manuscript map which has hitherto remained 'invisible'. This manuscript was produced by Friedrich Welwitsch (1806–1872), an Austrian botanist at the service of the Portuguese government, and held by MUHNAC (National Museum of Natural History and Science, University of Lisbon Museums/Museu Nacional de História Natural e da Ciência, Museu da Universidade de Lisboa, Portugal). This historical document contains names of several explorers, many of them 'invisible' explorers, located in different parts of the African continent, picturing the relationships in both a visual and geographical way with notes and relevant historical observations. Welwitsch, as so many contemporary fellow botanists, was in contact with many scientists, exchanging not only correspondence, but knowledge and collections. This map is a key document, a true hub of Welwitsch's network of knowledge in which the scientific networks, the types of actors, interactions, methodologies and practices of botany are revealed providing insights into the botanical exchanges that contributed to the making of Welwitsch's African collections.

Keywords: Africa; Botany; Friedrich Welwitsch; *Iter Angolense*; Manuscript Map.

1. INTRODUCTION

Friedrich Martin Joseph Welwitsch (1806–1872) was born in Maria Saal, in the Carinthia region, Austria. He studied Medicine in Vienna, where he developed his knowledge and abilities to become a botanist – a 'call' he couldn't resist. Amongst other networks, he was a member of the Württemberg Botanical Society, *Unio Itineraria*. Belonging to scientific societies, especially those devoted to natural history, was quite a relevant activity in German-speaking Europe, as emphasized by Phillips (2012, p. 8). Through this society, Welwitsch would be sent to an expedition to the Azores islands, one that was repeatedly postponed due to bad weather conditions. While waiting in Portugal, the botanist conducted several botanical excursions to the outskirts of Lisbon, and took the chance to learn Portuguese. Within six weeks, Welwitsch acquired a remarkable knowledge of the Portuguese language (most likely because he had good knowledge of Latin) and was able to quickly establish relations with official and scientific institutions in Portugal. It is worth noting that even the king D. Fernando II, was part of Welwitsch's network (Dolezal 1974), which reinforces the idea that: "expeditions had not only been prepared by supplying a scientific network, but also by providing a diplomatic-political one" (Klemun 2006, p. 233). These networks were central to the further development of his scientific career, as his ambition was to "get a relevant academic position within the Habsburg Empire" (Klemun 2014, p. 370). The contacts started through Robert Brown (1773–1858), curator of botanical collections in the British Museum and president of the Linnean Society, allowing Welwitsch to be elected to the Botanic Society of London and to the Geographical Society (Klemun 2014, p. 371).

Only from 1851 onwards, coinciding with a period of relative political stability, Portugal got the necessary conditions for the development of its imperial plan, which allowed greater continuity of government action. Bernardo de Sá Nogueira de Figueiredo (1795–1876, later Marquis of Sá da Bandeira (1854) relaunches the plan, in which Portugal's possessions would ensure access to profitable markets, always open to the products of their industry and agriculture, without dependence on the commercial policy of foreign governments, thus bringing economic advantages to the metropolis. Portugal believed in

the wealth of its African possessions, a dominant theme in the newspapers of all political factions in the first years of liberalism after 1834, as a basis for the defence of the colonial project and as a way towards national regeneration, thus compensating the loss of Brazil. The expedition *Iter Angolense* (1853–1860), led by Welwitsch, occurs at a time when the imperial plan begins to settle, in which Africa is seen in a mythical way as the *Eldorado*, ready to fulfil the destiny of the nation in which it eventually could recover the status of a great power (Alexandre 2004).

For a better understanding of these movements, it is crucial to bear in mind the world's broader political and economic picture of the nineteenth century, to which science is inextricably linked. Fresh data on geographical explorations in the tropics were exciting popular imagination, commercial ambitions, political challenges and intellectual discussions, arousing debates on health, racial issues, tradable commodities and colonial administration (Buttimer 2001, p. 106). As clearly put by Roy Macleod (Macleod 2000, p. 10):

By the end of the American Revolution, and the successful rebellion of Spain's American colonies, the world was set for the expansion of science as a global discourse. Within two generations, and certainly by the Treaty of Berlin – which divided Africa among the European powers – science had become a metonym for empire. . . . Governmentality, in the language of Foucault, assigned to science a pastoral influence in the regulation of colonial affairs. Whether favoured by Iberian mercantilism or Manchester free trade, European science came to rely upon a more or less continuing traffic with the overseas world.

Taking into consideration Welwitsch's knowledge on botany, networks and skills, it is understandable that when the Portuguese government started to think of an expedition to Africa, more specifically to the Angolan possessions, Welwitsch was the obvious choice, giving him the possibility to accomplish his lifelong dream. As the result of his expedition, Welwitsch collected about 5,000 plant species, of which 1,000 were new to science (Dolezal 1974).

During the expedition *Iter Angolense*, Welwitsch lived together with Dr David Livingstone for some weeks in September 1854 in Golungo Alto. As a result of this meeting, Welwitsch abandoned its original plans to cross the continent and visit the Portuguese possessions of the East African coast (Dolezal 1974, p. 56).

On the 3 September 1859, Welwitsch was the first European to describe the famous Namib desert plant, later named *Welwitschia mirabilis*, the wonderful, in his honour (Figure 1) (Dolezal 1974). Almost a year later, on the 31 August 1860, the infant Luís I of Portugal (1838–1889) arrived in Angola commanding the corvette *Bartolomeu Dias*, where he was received with enthusiasm by Luanda's inhabitants, as described by Welwitsch in his diary.¹ Although it is not known whether Welwitsch met infant Luís I during this period, there is a reference to a collection of *Birds of Angola* collected by Welwitsch offered to king D. Luís I dated from 10 March 1862, two years after the *Iter Angolense* ended.²

Figure 1. "Drawing of *Tumboa strobilifera*" *Tumboa strobilifera* Welw. ex Hook. f. is a synonym of *Welwitschia mirabilis* Hook. f." manuscript produced by Friedrich Welwitsch during the *Iter Angolense*, c.1859 (MUHNAC, LISU Herbarium).

Welwitsch's expedition is peculiar in that it was conducted by an Austrian botanist hired by the Portuguese government, and not by a scientific institution, during this period of national identity exaltation and execution of the colonial plan. *Mutatis mutandis*, it is possible to identify a similar attitude in the second half of the eighteenth century, during the well-known reformation process conducted by the equivalent of the Prime Minister today, Marquis of Pombal (1699–1782), who hired foreign naturalists – namely Paduan Domenico Vandelli (1735–1816) – to remodel and update Portuguese natural sciences, and to perform scientific expeditions throughout the Portuguese colonies (the so-called 'Philosophical Voyages'). When comparing the *Iter Angolense* with the 'Philosophical Voyages', the ideologies and contexts were obviously different, however, the scientific framework was the same, involving exchange and circulation.

¹ Welwitsch diaries are at the Natural History Museum, London (NHM), however, copies of these diaries can be found in Lisbon, ex-IICT archives (Botany, ref. Bot-12-G-4, folio 400), now at MUHNAC archives.

² "Collecção de Aves d'Angola off. ida pelo Sr. Dr. Frederico Welwitsch a Sua Mag.^{de}, El Rei, O Senhor D. Luiz I, Março 10, 1862", Cat. 45, REM_20160112164723, Museu Bocage, MUHNAC.

Welwitsch was supposed to explore the economic potential of the Angolan possessions by studying the tropical flora and informing the government on other issues of national interest (Dolezal 1974). In order to achieve this task, the networks of knowledge were paramount in sharing botanical practices and methodologies, connecting European scientists and gathering geographical information through locals (Burnett 2002). An example of this is mentioned in the Daily Telegraph: “Welwitsch gave Livingstone all the information he had been able to acquire regarding it [*sic*] by inquiries of natives who had come from that direction”.³ Indeed, as reminded by Robert Kohler (Kohler 2002, pp. 6–7):

Naturalists share the field with hunters, fishers, poachers, trappers, surveyors, tramps, madmen, shamans, loggers, prospectors, bird watchers, bandits, vacationers, herbalists, cowboys, students, con men, true and false prophets, and green terrorists.

We may definitely find some of those amongst Welwitsch’s network. ‘Masked Naturalists’ also appeared on Welwitsch’s map, one worth mentioning is Mr. Duville, which case will be described later in this paper. Some may even play a more important role in the process of producing scientific knowledge: they may well act as ‘go-betweens’, informing and translating trivial or crucial data. According to Kapil Raj:

We can distinguish at least four major functional types of go-betweens – the interpreter-translator, the merchant banker, the *comprador*, and the cultural broker who all also frequently carried and brokered specialized knowledges between communities. For instance, knowledge about the medicinal properties of plants and other natural products and their relative qualities depending on their provenance were commonly transmitted to medics and apothecaries by merchants and interpreters (Raj 2016, pp. 41–42).

During the *Iter Angolense*, the Austrian botanist collected botanical and zoological specimens and made scientific notes in various fields (botany, zoology, geology and others). His scientific work may be classified as “Humboldtian science”, a concept created by Susan Cannon (Cannon 1978) to describe 19th century scientific practices closely related to the work of Alexander von Humboldt (1769–1859). Its characteristics combined an ethics of precision and observation, field work, plus the sensitivity and aesthetic ideals of the age of Romanticism. The recognition of the interconnectedness of the flora and its respective environment is one of the new and important aspects of Humboldt’s work, which stimulated the development of phytogeography (his *Essai sur la Géographie des Plantes*, 1805), and even of a new, modern geography (Cannon 1978; Nicolson 1987; Buttner 2001). Welwitsch, indeed, produced in 1858 a phytogeographical work as a result of the *Iter Angolense*, namely the *Apontamentos phytogeographicos sobre a flora da provincia de Angola* [Phytogeographic notes on the flora of the province of Angola] (Choffat 1888, p. 10 footnote1), in which the interconnection of the flora, the climate, and the geological/geographical features are at the basis. He was also quite concerned about precision, as it is possible to see, for example, in the following passage (Welwitsch 1858, apud Choffat 1888, p. 12):

... I feel I have done what it was possible to do under the given circumstances and when it was possible for me to see and read the work of Livingstone, after my return from Africa, I had the satisfaction of observing that the greater part of the facts, of which I had taken note, corresponded with those which the English missionary had published. I shall likewise say that the measures of the heights, with the difference (...) which I attribute to a different quality or condition of the instruments, and I am certain that the apparatus I used was superior to those that Livingstone had in his travels.⁴

In the course of the expedition Welwitsch also produced maps, made drawings and watercolours of landscapes, as shown in Figure 2. As already remarked by Martin Rudwick (Rudwick 1976, p. 153):

The ability of most of the latter [nineteenth-century naturalist travellers] to draw field sketches with reasonable competence must surely be a factor of some importance in the development of the science, and it is probably related to the fashion of amateur drawing and watercolour painting ... most others [naturalists] were at least competent enough for their field sketches to be re-drawn to a publishable standard ... This widespread artistic skill points to the historical significance of a very general trend at this period towards a greater degree of visual awareness ...

³ Tuesday 31 August 1869, p. 5, Daily Telegraph & Courier (London), London, England.

⁴ Translated from the french: “... j’ai le sentiment d’avoir fait ce qu’il était possible de faire dans les circonstance données et lorsqu’après mon retour d’Afrique, il me fut possible de voir et de lire l’ouvrage de Livingstone, j’eus la satisfaction de constater que la majeure partie des faits don’t j’avais pris note, correspondaient avec ceux que le missionnaire anglais avait publiés. J’en dirai de même des mesures des hauteurs, avec la différence (...) que j’attribue à une qualité ou à des conditions diferentes des instruments, et je suis certain que les appareils dont je me suis servi étaient supérieurs à ceux que Livingstone avait dans ses voyages.”

The fact that Welwitsch drawing skills have not been mentioned by his biographers, such as Dolezal, it is a reflection of the fact that “explorers of the time did not want to be regarded as artists and were careful not to boast about their artistic skills” (Koivunen 2013, p. 196). This particular collection of manuscripts is housed at MUHNAC archives (National Museum of Natural History and Science, University of Lisbon Museums/Museu Nacional de História Natural e da Ciência, Museu da Universidade de Lisboa, Portugal) and in this paper we highlight the ‘Map of Explorers’ (Figure 3).

Figure 2. Detailed representation of the geological profiles of some districts of the Angolan territory, manuscript produced by Friedrich Welwitsch during the *Iter Angolense* between 1853–1860 (MUHNAC, LISU Herbarium, Cx.3, fl452f).⁵

2. THE ‘MAP OF EXPLORERS’

Figure 3. ‘Map of Explorers’, manuscript produced by Friedrich Welwitsch (MUHNAC, LISU Herbarium, Cx.1, fl233f).

The ‘Map of Explorers’ (Figure 3) is a detailed manuscript, a key document in which Welwitsch gives an insight into his knowledge through its meticulous notes.⁶ This map depicts what was relevant to Welwitsch and contains names of several actors located in different regions of the African continent, picturing the relationships in both a visual and geographical way with notes and relevant historical observations (joint expeditions, who was involved in the production of certain flora, where a certain explorer died, etc.) that are crucial in the name identification process.

What was the purpose of this manuscript? Making a preliminary analysis, it seems that Welwitsch intended to condense all the scattered information (newspaper clippings, publications, notes, correspondence, etc.) in a synthesis map, a single manuscript where he could easily see ‘who did what and where’. Taking into consideration that he was studying his African collections, it was important to know which botanists/explorers were also in the field and/or dealing with the African flora, making this manuscript a working tool in the study of his collections.

The observation of the map in more detail allows us to extract various kinds of information: the explorers’ names are spatially distributed throughout the African continent, although unevenly (they are concentrated in the South and on the Atlantic sea border); the presence of arrows indicates the direction of the route (which is very useful in the identification of explorers’ names and expeditions); Welwitsch is keen to specify the places where he was during the *Iter Angolense*; notes on the side of the map provide extra information; references to ladies’ names (Barber, Elliott, Holland, Saunders, Tinné and Turner).

In order to identify the names on the map, some literature was consulted (Oliver 1896; Edwards 1972; Gunn *et al.* 1981; Klemun 1990; Desmond 1994; Quattrocchi 1999; IPNI (International Plant Name Index) 2005; Klemun 2014; Jstor Plant Science 2016) as well as online herbaria (Royal Botanic Gardens Kew 2016; Museum National d’Histoire Naturelle Paris 2016). To facilitate the identification process, a grid was overlapped on the map (Figure 4 and Table 1). In addition, these data were intersected with Welwitsch archives at MUHNAC (Welwitsch’s correspondence and agenda: list of names and dates of letters sent from London since 1863). Following this procedure it was possible to know, from all the names identified on the manuscript, with whom Welwitsch exchanged correspondence. From the 94 names present on the manuscript, 78 were identified (of which 11 were Welwitsch correspondents) and 16 names remain unidentified or unknown (Table 1).

Figure 4. ‘Map of Explorers’ with grid (MUHNAC, LISU Herbarium Cx.1, fl233f).

⁵ Welwitsch also made some geological cuts, however the samples were lost, leaving only the field notes which later were published by Paul Choffat (Brandão *et al.* 2015, p. 19).

⁶ This manuscript is available online at https://www.instagram.com/muhnac_illustrations/ as part of the Project ‘Riscar o Mundo’ funded by Calouste Gulbenkian Foundation, Portugal.

Table 1. List of explorers' names present on Welwitsch's manuscript map.
(* - Welwitsch correspondents; ¹ - Sailed to India via the African cape)

The presence of British subjects on the map is worth noticing: 31 out of 78 – roughly 40% of the total. They were followed by Germans – 18 out of 78, i.e., around 23% (Figure 5 and Table 2). This is a result, of course, of the activities of European governments in Africa, particularly of Great Britain, that involved science in their imperialist projects (Worboys 2000, p. 164).

Figure 5. Representative graph indicating the explorers' origin.

Table 2. Explorers' origin.
(* - Welwitsch included)

3. 'INVISIBLE' EXPLORERS

Like so many of her male counterparts who went to Africa, she [Miss Tinné] was transformed into an explorer by the desire to fill in the blank spaces on the map (Cardona 2012, p. 138).

In this section, cases of invisible and/or less known explorers will be briefly exposed. As mentioned previously, Welwitsch refers to at least six ladies in his manuscript (with some repetitions such as the cases of Saunders and Tinné), an element that demonstrates how important and relevant their work was, in such a way that they were among other famous explorers. However, apparently, he did not exchange any direct correspondence with these female explorers. Still, it is worth noting that although the Austrian botanist did not exchange correspondence with Miss Tinné (Alexandrine Petronella Francina Tinné, 1835–1869) (Figure 4, E3E4 & F2F3), he was in contact with Karl Georg Theodor Kotschy (1813–1866) (Figure 4, F3), who later published *Plantae Tinneanae* (Figure 6) based on Tinné's expedition (Kotschy 1865). Miss Tinné was a recognized explorer who took “several journeys on the Nile and its tributaries” between 1860–1865 and “filled the roles of noble lady, adventuress, explorer, and that of Victorian lady traveller” (Cardona 2012, p. 124).

Figure 6. Publication *Plantae Tinneae in Expeditione Ad Bahr Ghazal* (Kotschy 1865) at MUHNAC that belonged to Friedrich Welwitsch.

Another lady's name that appears and is discreetly written in pencil on Welwitsch's map (Figure 4, A5) is 'Miss Turner'. The locality where this name emerges, near Sierra Leone (also written in pencil) confirms that this is Miss Turner (fl. 1820s), the one who collected plants in that country in 1826, although most of her collections are lost with the exception of some plants that still exist at RBG, Kew (Desmond 1994, p. 695). Not much is published on this lady, although her name is mentioned on the Niger Flora (Bentham *et al.* 1849, p. 229) and on the *Flora of Tropical Africa*: “. . . the Kew Herbarium contains valuable sets from . . . Sierra Leone, collected by Don, Whitfield, Miss Turner, and others” (Oliver 1868, p. VIII).

In relation to expeditions, it is also possible to observe on the map the reference to Beutler's Expedition to Caffraria, South Africa, which took place in 1752 (Figure 4, F9G9) under Ensign August Frederik Beutler (Glen *et al.* 2010, p. 54).

It is worth mentioning that Welwitsch's correspondence was essential for the confirmation and resolution of some doubts related to the identification of names. For example, the case of the Schimpers:

Welwitsch exchanged correspondence with Wilhem Philipp Schimper (1808–1880), but on the manuscript map he was actually referring to his cousin, Georg Heinrich Wilhem Schimper (1804–1878) (Figure 4, F3F4), who was a member of the *Unio Itineraria*, such as Welwitsch, and travelled in the north of Africa (Edwards 1972, p. 299).

While in Angola, Welwitsch also had the opportunity to meet, just for a few hours in 1858, the botanist Heinrich Wawra (1831–1881) (Figure 4, C7&D10), who recognized Welwitsch's vast knowledge in botany. Wawra, an on-board doctor at the Austrian corvette *Karolina*, was part of an expedition with the purpose of establishing trade relations with South America (Dolezal 1974, pp. 61–62). After this meeting, both botanists exchanged correspondence, already in 1858 (Edwards 1972, p. 300). This example clearly demonstrates how important Welwitsch's network is. By knowing his contacts and encounters in more detail, it is possible to establish time limits regarding the map dating. In this case, it can be inferred that the manuscript was not produced before 1857 because Wawra appears referenced and he met Welwitsch in 1858.

Through Welwitsch's correspondence at MUHNAC it was possible to decode some of the names present on the manuscript map.⁷ One example was Duville (Figure 4, C7): according to one of B. António Alves letters, Mr. Duville was a French man who arrived with his wife in Luanda in 1828 pretending to be a naturalist on a scientific expedition, but turning out to be a slaver.⁸ Probably this is why his name appears on the map with an exclamation mark.

In contrast, there are also other cases in which 'visible explorers', such as David Livingstone, do not appear on the map. However, this silence may reveal more than it seems.

4. "DR LIVINGSTONE, I PRESUME?"

As mentioned previously, Welwitsch met Livingstone while they were in Angola in 1854. However, the name of the famous explorer does not appear on the manuscript map. Why does Livingstone's name not appear on the map? Why does Livingstone remain 'invisible'? Norton Wise reminds us that "much of the History of Science could be written in terms of making new things visible – or familiar things visible in a new way", and it is important not to limit ourselves "to the literal sense of things visible to the eye, and leaving aside what the mind's eye may also see" (Wise 2006, p. 75).

Having this in mind, although silent, the manuscript can still provide valuable information in this respect. The answer to these questions could be relatively simple: if the name Livingstone is not shown on the map it was probably because he had 'disappeared' in the period during which the manuscript was produced.

The Scottish explorer lost contact with the outside world for six years and was only located in November 1871 by Henry Morton Stanley (1841–1904) in the village of Ujiji near Lake Tanganyika (Murray 2013, p. 150). Taking into consideration that Welwitsch was very meticulous while writing his notes, listing all the known and less known explorers in Africa on his map, it does not make sense that such a figure as Livingstone does not appear on the map. However, Livingstone's invisibility can be attributed to the fact that he stopped sending news. For this reason, it is plausible that Welwitsch's map was produced from 1865 onwards (five years after the *Iter Angolense* ended). Given that this map is not dated, this information is crucial, so we can have at least an idea of the period when the map was produced.

In addition, Welwitsch archives at MUHNAC show that the Austrian botanist was particularly interested in Livingstone's 'disappearance'. He collected several newspaper clippings on the subject and organised them in separate files. Welwitsch also wrote to the Editor of the *Daily Telegraph* on the 16 August 1869 (copy of the letter at MUHNAC entitled "Dr Livingstone's probable route") referring to how they met and suggesting possible routes, taking into consideration the conversations and information that

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⁷ MUHNAC, LISU Herbarium, Pasta C.N. Tavares, Cartas de B. António Alves para Frederico Welwitsch/Letters from B. António Alves to Friedrich Welwitsch - Copies from the Natural History Museum, London (1962).

⁸ Letter from B. António Alves to Friedrich Welwitsch, Lisbon, 5.4.1864. LISU Herbarium, MUHNAC, Pasta C.N. Tavares, Cartas de B. António Alves para Frederico Welwitsch/Letters from B. António Alves to Friedrich Welwitsch - Copies from the Natural History Museum, London (1962).

both shared while living together for several weeks in 1854. On the 31 August 1869 the *Daily Telegraph* mentions Welwitsch suggestions concerning Livingstone possible routes.⁹ This might mean that the botanist was genuinely concerned about Livingstone, and as an African explorer, was expressing his solidarity, his 'scientific ethos' towards an objective: finding an explorer colleague. It is important to take into consideration that in the 19th century, it was quite common among naturalists/scientists to exchange not only information through lectures, intensive correspondence, and journals, such as the case mentioned above, but also to offer specimens (botanical, zoological, etc.) as a sign of gratitude.¹⁰ Furthermore, publications by the authors and laboratory tools (microscopes, magnifying glasses, for instance) were frequent gifts among scientists.¹¹ ¹² However, Welwitsch was writing to a British newspaper with large and specific audience; therefore, besides contributing to a cause, Welwitsch's name would be also on the news and linked to a famous explorer. In this way, he was also advertising his name and previous work in Africa – the expedition, *Iter Angolense*, obtaining visibility and recognition, which was something Welwitsch expected.

It is pertinent to mention that most of the names that appear on the newspaper clippings commenting on Livingstone are also present on Welwitsch's map in specific locations. This deeply reinforces the idea that Welwitsch was crosschecking the information between newspapers, publications and correspondence and the map itself was the result of this compilation. By doing so, Welwitsch turned explicit his network and objectives while producing the map.

Although the encounter between Welwitsch and Livingstone has not yet been studied in depth, as mentioned by A. W. Exell and E. J. Mendes (Dolezal 1974, p. 56), there is enough material from both explorers worth being examined and studied, and this will be in the subject of a future paper.

5. IS THE MAP A KEY?

As pointed out by Leila Koivunen, "Map-making was an important means of gaining credibility for a nineteenth-century traveller to Africa, and this scientific pursuit was strongly encouraged by the Royal Geographical Society" (Koivunen 2013, p. 196). This was probably one of the reasons why, besides his "humboldtian style", Welwitsch as African explorer and traveller, not only collected zoological, geological and botanical specimens but also made maps and took geographical notes, not exclusively to locate himself, but also as an important tool for the study of his collections and to gain credibility.

It might be useful, in order to understand the collection of samples, and works done by Welwitsch, to take into account the categorization proposed by Pyenson, some decades ago, for naturalists – namely, 'functionaries' and 'seekers' (Pyenson 1985). As this author puts it, "the functionary intended to interweave his research institution into the social fabric of his setting", while the seeker "intended to use his research institution to produce new and original scientific results" (Pyenson 1985, p. 389). Welwitsch, although officially supported by the Portuguese government – so, apparently a 'functionary' – fits no doubt into the 'seeker' profile:

Seekers were interested in advancing the cause of knowledge. . . . The research programs might have been precise or vague, but the commitment existed to present new knowledge before civilized readers. . . . The discipline transcended institutional and especially national frontiers. The seeker might have gone with the blessing of metropolitan superiors, but he acted as an independent entrepreneur abroad (Pyenson 1985, p. 390).

This manuscript map stands out among Welwitsch's archives at MUHNAC, although there are many other maps and sketches in his collection worthy of being studied in detail. These maps are

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⁹ See Footnote 3.

¹⁰ In the case of Welwitsch, Günter mentions in his correspondence: "On the first day on which he [Welwitsch] could leave the house, he called on me at the Museum [British Museum] to express his thanks for all I had done for him; and after some time he delivered to me a miscellaneous lot of bottles with animals in spirits offering them to me personally as a free gift." Letter from A. Günter to Bocage, Zoological Dep., 26.6.1876, ref. CE/G-88, Arquivos Museu Bocage/Bocage Museum Archives (MUHNAC).

¹¹ Among Welwitsch's personal library (at MUHNAC) it is possible to find many books autographed by the authors that were offers to the Austrian botanist.

¹² Robert Brown (1773-1858), who is also mentioned in Welwitsch's map, offered to the Austrian botanist a pocket magnifier as a remembrance, which Welwitsch proudly showed to his visitors/colleagues (Dolezal 1974, p. 46).

different from the one studied in this paper, some are very precise and others are pictorial maps. These precise maps and geographical notes reveal Welwitsch's deep knowledge in geography. However, it is important to bear in mind that in order to decode his notes, maps and drawings, one must see the collection as a whole, in which all documents are connected. Moreover, most of them are personal notes, written in several languages and sometimes with a very difficult handwriting, which makes them very challenging to unscramble (Choffat 1888, p. 9).

The particular map under scrutiny here, besides compiling information related to various explorers, from better to less known ones, from gentlemen to ladies of different nationalities, also leads to several possibilities of discussion. In order to study the role of this map as an "image with historically specific codes" (Harley 1988, p. 277), it was necessary to deconstruct it, "to read between the lines of the map" (Harley 1989, p. 2) because it is much more of what it appears to be at first sight. This manuscript map can be seen as a document with several layers of knowledge, namely: a synopsis by condensing and compiling different kinds of information; a work tool, allowing the author to build up and visualize his network related to the exploration in Africa; a key to Welwitsch's personal library; a visual synthesis of the action of imperial powers in Africa; and the potential to be a map by itself.

Through the study of this map it was also possible to find part of Welwitsch's personal library, because most of the names listed on the manuscript were actually Welwitsch references. In this way, while searching at MUHNAC's Botany Library at LISU Herbarium it was easier to pick up the botanist's books, because most of the authors were listed on the map. All the books were confirmed to have belonged to the Austrian botanist because of the existence of his signature at the beginning and notes throughout the books. This is also a relevant question that will be discussed in a future paper.

6. CONCLUSION

What are needed, for a fuller understanding of the processes by which scientific knowledge is shaped, are empirical studies of science in the making – whether in the past or the present is of lesser consequence – which focus not on one individual scientist but on a specific *problem* that brought together some *group* of individuals in an interacting network of exchange (Rudwick 1985, p. 6).

This paper is the first contribution, the first glance, at this particular map. The authors hope that as a result of the publication of the article, other perspectives, other glances will provide new answers and eventually more names that belong to Welwitsch's network of exchange. Many identified names cited in the manuscript map of Africa are associated with the *Unio Itineraria*, the same Botanical Society of which Welwitsch was a member, so it seems quite natural that these names appear in the botanist's network. There are also several names of naturalists/explorers that were in Africa before the *Iter Angolense*, such as Mungo Park (1771–1806) and Carl Peter Thunberg (1743–1828), and others such as Horace Waller (1833–1896) who went to the African continent after Welwitsch's expedition, attesting the construction process of the knowledge-chain in the temporal and spatial dimensions. Some names indicated on the map only made stopovers in Africa, South Africa in particular, such as the case of Nathaniel Wallich (1786–1854), but were nevertheless referenced by the botanist. On the other hand, Livingstone's case, because he does not appear on the map, allows us to have an idea of a possible date of the manuscript.

Welwitsch notes placed at MUHNAC historical archives were a central key in the process of name identification, as well as in the manuscript interpretation, and in the reconstruction of this naturalist's scientific action. As a result, almost 83% of the names were identified. No doubt, Welwitsch, an "ambitious colonial botanist" aimed at being recognized as a specialist in Africa, and his correspondence so demonstrates it (Klemun 2014, p. 376). Through Welwitsch it is possible to realize his networks of knowledge, with whom and how it was related. We confirmed that he exchanged correspondence with at least 11 of those whose names are mentioned in the map. The others were probably part of his literature review, leading to his personal library, forgotten at the botany library at MUHNAC. In which way did these relations influence the construction of the collections? What do they tell us, in particular, about the action of European empires in Africa and the relationship of science to that process? A deeper plunge into the map may give some answers. Despite the many gaps still remaining, it is nonetheless possible to trace the explorers' average profile: male, Anglo-Saxon, working preferably in botany and/or entomology, who journeyed in an African expedition while they were between 20-30s years old.

Being a ‘seeker-type’ naturalist – the predominant pattern amongst German naturalists, according to Pyenson (Pyenson 1985) –, it is reasonable that transnational networks were of paramount importance to him, as well as the exchange of correspondence, specimens and printed papers – that is, ‘networking’ in practice. Being Austrian, Welwitsch surely shared these Germanic characteristics. As indicated by Denise Phillips:

To understand the social structure of German science through the middle of the nineteenth century, it is essential to recognize that ‘the learned world’ remained a viable organizational idea well after 1800. (...) Furthermore, it was not just the *concept* of the learned world that survived; many older patterns of learned sociability persisted, too. The early modern republic of letters organized itself through published exchange, but also through letter writing and learned societies (Phillips 2012, p. 14).

The quote at the beginning of this section shares the idea of the research process used when deciphering this manuscript map. The focus was “not on one individual scientist” but on a specific objective: to understand the document, reveal its layers, and see beyond the obvious, which eventually led to a “group of individuals in an interacting network of exchange” that were naturalists, travellers, explorers, geographers, men or women with a similar mission: “the desire to fill in the blank spaces on the map”.

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ARCHIVES

Daily Telegraph & Courier (London), London, England, Tuesday 31 August 1869, p. 5.

MUHNAC (National Museum of Natural History and Science, University of Lisbon Museums/Museu Nacional de História Natural e da Ciência, Museus da Universidade de Lisboa, Portugal), Arquivos Museu Bocage/Bocage Museum Archives, “Collecção de Aves d’Angola off.ida pelo Sr. Dr. Frederico Welwitsch a Sua Mag.de, El Rei, O Senhor D. Luiz I, Março 10, 1862”, Cat. 45, REM_20160112164723.

MUHNAC (National Museum of Natural History and Science, University of Lisbon Museums/Museu Nacional de História Natural e da Ciência, Museus da Universidade de Lisboa, Portugal), Arquivos Museu Bocage/Bocage Museum Archives, Letter from A. Günter to Bocage, Zoological Dep., 26.6.1876, ref. CE/G-88.

MUHNAC (National Museum of Natural History and Science, University of Lisbon Museums/Museu Nacional de História Natural e da Ciência, Museus da Universidade de Lisboa, Portugal), ex-IICT archives (Botany, ref. Bot-12-G-4, folio 400).

MUHNAC (National Museum of Natural History and Science, University of Lisbon Museums/Museu Nacional de História Natural e da Ciência, Museus da Universidade de Lisboa, Portugal), LISU Herbarium, Pasta/Folder C.N. Tavares, Cartas de B. António Alves para Frederico Welwitsch/Letters from B. António Alves to Friedrich Welwitsch, Copies from the Natural History Museum (NHM), London (1962).

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