Object Biography of a Series of Radioactive Drill Cores from Shinkolobwe, Democratic Republic of Congo

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Abstract

This object biography takes as its starting point a radioactive drill core encountered in a collection of geological samples in the Democratic Republic of Congo. Departing from a double blindness of not having seen the core and not being able to see its radioactivity, significant connections are drawn out between where the core is stored and the colonial context it was extracted from. This relation is further complicated by focusing on the mineral extraction it informed, what the mineral extracted it informed was used for, and the fate of the stored core. The biography of the mineral sample is furthermore pieced together by consulting related paper archives and addressing wider social and environmental effects.

Keywords: Mineral prospection, subsurface, extraction, radiation and waste disposal

Introduction

This text is a biography of a series of drill cores, or, in the wider sense, of the underground. While the deep subsurface is difficult for humans to access, drill cores – cylindrical samples retrieved from vertical incisions that are narrow in diameter but typically reach great depths – make portions of the underground visible for earth scientists. These samples do not only render the underground visible: they also make it extractable and tell a story of its extractability. This paper thereby joins a growing chorus of scholarship that brings together the geological with social questions (Yusoff 2017; Hecht 2018; Kinchy et al. 2018; Ballestero 2019)[1] by focusing on how underground environments are shaped and the role museums play in communicating this information.

I begin by relating an encounter with a series of drill cores during ethnographic fieldwork in a warehouse in a small town[2] in Haut-Katanga, a southern province of the Democratic Republic of Congo (DRC), which was a Belgian colony from 1908 to 1960.[3] My encounter was distant and fleeting, partly due to the cores' high levels of radioactivity; so high, that I did not actually see the cores I write about. The register of visibility is especially arresting when it comes to this series because radioactivity is not seen either – it is measured. The radioactive property of these objects therefore complicates the notion that what lies underground can be seen and that proximity produces familiarity. It also stresses that biographical work is fragmentary. This biography pieces together time spent among paper archives based in Belgium and among mineral collections in storage in DRC. First, this brief essay introduces the set of cores; then it sketches their biography as a way of analysing them; and finally, it discusses their absence from most museum cabinets. At the same time, the argument extends beyond the series of cores towards the underground that is marked by industrial extraction and the lasting legacies of colonialism.

A close encounter

In a small mining town in the province of Haut-Katanga, DRC, a warehouse storing mineral collections is stacked with drill cores in boxes piled up from floor to ceiling. The collection dates back to the early colonial period when there was only one Belgian mining

company in the region. Today, it is located on the perimeter of a vast complex of a company that is owned by the Congolese state and that also hosts a mineral museum. My gaze in this warehouse is directed to a section that is taped-off at waist height at one end of an aisle. The yellow flagging tape reads 'CAUTION!' in black lettering. I learn that the stack of drill cores behind this tape has been deemed too high in radioactive content to be kept in the collection or exhibited in the adjacent mineral museum, so I hold back. However, I do take a photo from a distance (fig 1).

Figure 1: Radioactive cores in boxes in a densely packed warehouse and the yellow flagging tape. Credit: Author's own.

I later understood the significance of my step back, my decision not to go down the aisle, not to get any closer. The precautionary measure I took was much greater than the perimeter the tape demarcated. Whether the tape or my step back corresponded to anything like a safe distance is hard to verify.[4] I did not want to get close to the drill cores I write about here. Not physically, and certainly not close enough to see them, touch them or even smell them. In the presence of the taped-off section, I was not thinking of the cores as something to look at, not even as something to write about, but as something that would have a harmful effect on me. But this encounter was not only about me. The person showing me around the storage collection had offered to take cores off the shelf for me to see. But the cores behind the tape were out of bounds.

As a result, this article concerns a distance that results in an absence, significant because it coincides with colonial histories that have been minimized or erased. While minerals are frequently displayed, cores – even when they are not radioactive – are rarely seen in museums.

My not having seen these cores has become a topic of conversation with earth scientists I have met since. One geologist remarked, echoing others: 'I would have looked in the boxes for sure, it would not have been pure uraninite. I think you can at most expect some secondary uraninite minerals or veins'. I was told to have expected these veins to be a heavy black colour, without crystal forms.[5] However, I remain unfamiliar with the physical

materiality of my objects of study, which made their radioactive property more prominent and distinguished them from the many other cores in the storage collection and defined our distant – and privileged – fleeting relation. As time went on, I became progressively more and more interested in this radioactive quality. Much like the underground that lies below our feet and typically out of sight, my not seeing the radioactive cores heightened my attention to sensory assumptions about the prominence of seeing. In a call to question normative assumptions of haptic as proximate and vision as detached, anthropologist Andrea Ballestero coins the term 'embodied sensing' (Ballestero 2019: 764) in her work on satellite imagery of underground aquifers. Had I ignored the 'caution' signs and peered into the boxes, I would not have been able to see the radioactivity anyway. Departing from this double inability to see – not seeing the cores or the radiation – I wonder whether the distance I maintained then was a necessary condition to flesh out their story and write about them now. Had there been no tape, had I seen the cores, had I found it easy to access information about them, I might not have been so struck by them. This challenges the usual relation of proximity encouraged in empiricist research. As it was, as the distance between me and the cores grew, when I left the storeroom, the museum space, the small town, and the DRC, I paradoxically became increasingly aware of their radioactivity.

Arjun Appadurai (1986) writes about the *social* lives of things. This object biography is grounded in this very brief encounter, which is just a tiny part of the cores' trajectory that I will begin to unpack. In this case, it is the *asocial* qualities of these cores that put me to work to draw out connections between the cores, the stored collection, the place they come from, and many bodies other than mine. It is an object biography that is relevant for museums because they, too, must deal with intangible heritage; the difference in this case is that the heritage is intangible because it is dangerous.

Core biography

A biography is a literary genre typically attributed to living beings, more often than not to a human and their relationship to other humans. But Science and Technology Studies (STS) scholar Donna Haraway, in the context of her work on the dioramas in the African Hall of the American Museum of Natural History in New York City, highlights the inherently social relations of non-human things when she writes: 'Behind every mounted animal, bronze sculpture, or photograph lies a profusion of objects and social interactions among people and other animals, which in the end can be recomposed to tell a biography embracing major themes for twentieth century United States'. She adds: 'But the recomposition produces a story that is reticent, even mute, about Africa' (Haraway 1984: 21). The objects I deal with are not mounted on display in a museum but relations to other objects and humans can be drawn out. Drill cores are tools of scientific enquiry, as evidenced by the fact that they are kept in storage for earth scientists to access and therefore rarely on display as 'things' in museums (Daston 2000). Nevertheless, the cores are also embedded in a profusion of interactions, or 'vessel[s] for a bundle of relationships' (Alberti 2005: 561) as Samuel Alberti refers to them when drawing on the concepts of Appadurai and Igor Kopytoff on object biographies.

An alternative approach to address the cores would be an object itinerary. To avoid the danger of anthropomorphizing objects in biographical work, literary scholar Gemma Nisbet (2021: 2) focuses on the nonlinear 'itineraries' that objects move through or are moved through rather than their human-like properties. Nisbet's focus on objects' trajectories inscribes them with temporalities and the capacity to act as 'vessels' for memories that travel. The movements of cores addressed in this piece are particularly difficult to track; this is related to attempts to mediate what should be remembered. And because this is related to keeping the hazardous impacts quiet, I argue that a focus on itineraries ultimately centres human-object relations, minimizing the relationship of objects to their surrounding environments.

The writing of this biography of drill cores seeks to blur the distinction between the rock sample and the wider underground it comes from. I argue that one cannot be considered without the other. Human lives are also not separate from the rock cores. For cores to exist as objects they must be extracted by prospectors with electronic machinery. Just as there is no inert rock without biotic life forms, a core is both inorganic and organic, both artificial and

natural. The decision to write a biography rather than an object itinerary of this set of drill cores yokes together a rock sample with a metaphor for the lengthy process that formed it and the conditioning of the wider environment that the cores go on to shape. By informing the extraction of radioactive material, these cores and their emissions of gamma rays and radon gas informed a project that in turn impacted many lives far beyond those working in the places of their extraction and storage and over long lasting temporalities, beyond human lives. In this way, too, the cores point to a paradox for museums – how to capture for visitors processes of such long duration. Biographies or lives[6] are lengthy, yet certain aspects are typically recounted while others remain untold. I consider this partiality inherent to this narrative form. But the stories of certain objects and lives are also more readily told than others, especially in museums, and this paper seeks to include these less readily told lives, about Africa, to come back to Haraway's quote, without forfeiting the cores' implications in global history, on the wider environment, and in times to come. This biography therefore brings together many lives and places, human bodies and the body of the underground through the lens of a global nuclearity. From the collection space, this biography goes on to another locality in DRC.

Shinkolobwe cores

Some of the cores behind the yellow flagging tape in the storeroom came from Shinkolobwe, also in the province of Haut Katanga.[7] In order for cores to be used for geological study the precise location from which they were removed must be known. I refer to cores from Shinkolobwe in the plural because three major geological forays took place during the Belgian colonial period: the first from March 1921 to June 1924; the second from the end of 1927 to March 1936; and the third beginning in 1944, when the underground mine was re-opened.[8] Geologists' reports and drill core analyses directed the expansion of extraction from two major quarries. The different phases of exploitation explain the sheer number of boxes of cores behind the flagging tape in the photograph (fig. 1).[9] That said, there are other localities in DRC from which radioactive cores can and have been surfaced. By focusing on a series of cores from a single location, I mimic the way these earth scientists typically study cores.

As an anthropologist, I embark on this enquiry to familiarize myself with a series of objects that are typically studied by geologists.[10] However, I do not limit myself to where the cores come from. My analysis opens to aspects of cores that are less readily told by earth scientists and almost never seen in geological museums. Scrutinizing a scientific tool through the anthropologists' lens brings to the surface more than a sample from a specific site containing a representative mineral content to inform an extraction project (or end it).

Consulting paper archives of colonial history in Brussels, I was able to connect the radioactive cores in the storeroom in Africa with large quantities of radioactive minerals shipped via Belgium. The radioactive drill cores derive from a few of the extensive explorations led by Union Minière du Haut Katanga (UMHK). The UMHK was founded in 1906 to exploit mineral resources in a 20,000 square kilometre concession in the Congolese province of Katanga. This company was one of the major beneficiaries of the Belgian colonial regime.[11] Many of its paper archives were moved from Congo to Belgium during the 'operation archives' in 1959, the year prior to independence (Piret 2015: 53). The cores, however, remained in DRC. Until 1997, only the colonial archives created in Belgium were accessible to researchers; those exported from DRC were kept unsorted and inaccessible. Lending attention to archives not only as sites of research, but also as objects of research, I draw on the field of the materiality of archival practices (Farge 2013 [1989]; Both 2017) and in particular colonial archives (Stoler 2009; Hartman 2008; Azouley 2019). This biography highlights the uncanny parallel between traces of colonial paper archives and traces of colonialism in the geological archives and the questions of inaccessibility in both.

From the paper archives of colonial history (and their interpretations by historians), I understand that the cores were first used to inform an industrial extraction in Shinkolobwe for a radium market in Europe. Radium was used in cancer treatments and luminous paint.[12] From 1933 to 1936, the Shinkolobwe mine was also exploited for gold and palladium.[13] By 1944, uranium was prized on the global market for its radioactivity.[14] But relevant archival information is complicated to access, especially around these later phases of extraction.

Many documents are now inventoried but still confidential. They have been transferred to the Royal Archives of the Belgian State, but private companies can still restrict access to them. Decolonial scholars in Belgium have urged for archives of colonial enterprises to be made more accessible, but the criteria for access remain opaque.[15] Then, occasionally, a document gives away a lot of information.

The photo in Figure 2, for instance, was taken as part of a promotional campaign in the control tunnel of the Shinkolowbe mine complex in 1945. The original caption describes measuring the radioactivity of a trolley of extracted matter, using a Geiger counter to estimate its uranium content.[16] And yet, the fact that radioactivity was measured does not imply that there were any formal regulations limiting hazards for those working with the material. The caption expresses a form of colonial violence by omitting mention of the workers' exposure, thus placing profits before human health. Indeed, Gabrielle Hecht writes precisely about how much effort it took to obscure the occupational hazard of working with 'nuclearity' in South Africa during the same period (Hecht 2012: 95).

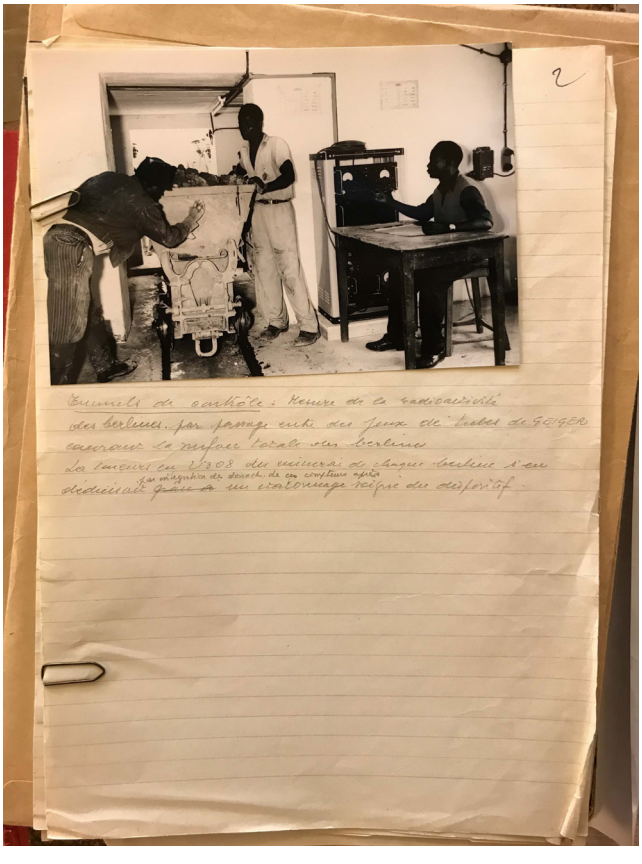

Figure 2: Archival image of a control station at the Shinkolobwe mine, 1945. Credit: AGR 2, Union Minière. First series, n°2925.

In the year in which the photo was taken, the extracted and treated radioactive material was shipped to the United States.[17] The first contracts between African Metals Corporation (Afrimet), a branch of UMHK set up in New York, and the Manhattan Engineer District were signed in October 1942. From 1944 a bilateral agreement between the Belgian government and the Combined Development Agency secured a ten-year uranium supply, from which UMHK would profit. Attempts to quantify the amount of matter that was shipped would need

to overcome the traces that have been covered up and compensate for the fact that waste matter produced by uranium processing is rarely accounted for, yet never disappears.[18] One of the illustrious ways the uranium from Shinkolobwe was put to use makes this point very poignantly. Once enriched, the matter moved from Shinkolobwe via Belgium to the United States, where it provided most of the uranium necessary for the Manhattan project — the construction of the test bomb in July 1945 and the atomic bombs dropped on Hiroshima and Nagasaki one month later.[19] Here, the repercussions of radioactive fallout are still far reaching. The bombs took innumerable lives at the time and since. The lasting effects of exposing people and environments to radioactivity cannot be isolated either. In this way, the extraction of these cores connects four continents, though by no means on even ground. And the measuring of the radioactivity of the sample in the stored collection makes evident the wider geopolitical context the cores participate in both in DRC today and in Japan. Such histories of radioactivity can be connected to museum displays, too.

Radioactivity exposed

When I visited DRC in 2022, the external body that carried out the measurements of the Shinkolobwe samples in the collection had clearly considered certain cores to be too dangerous to be kept near those working there. From that moment on, the status of those Shinkolobwe cores in the collection changed; they were taped off. Alberti (2005: 567) writes that 'the object biography is also a valuable way of tracing the changes in classificatory schema, theoretical frameworks, and debates surrounding the objects'. In this case, changes in administrative frameworks surrounding radioactivity occurred differently in Belgium and in DRC, but in both cases radioactive samples were distinguished from the rest. This photo (fig. 3) was taken just one year after fig 2. It is of an isolated geological sample on display in a glass case at the Royal Museum for Central Africa (RMCA) in Tervuren, Belgium. The director of the Museum, Lucien Cahen (left), and the Belgian King Baudouin (right) are standing in front of a large sample of uranite block, also from Shinkolobwe.[20] The two men are manifestly unprotected, close-up, and seemingly unperturbed. The noxious effects of the exhibit raised concerns, yet it was only taken off display in the 1970s. This history continues to pose pointed questions about the lasting invisible harms and the complexities of displaying colonial projects.

Figure 3: 27 June 1953, Royal visit at the Royal Museum for Central Africa, Belgium. Credit: HP.1955.54.86, collection RMCA Tervuren; photo F. Dubus, 06-27-1953 © RMCA Tervuren.

This same block of uranium-bearing rock is now kept in a dedicated storage room that holds all uranium-bearing specimens of the RMCA mineral collection, in line with regulations imposed by the Belgian Federal Agency for Nuclear Control. This storage is separate from the rest of the museum, in a specially designed basement with restricted access, and behind a heavy metal door in a ventilated room.[21] These costly measures taken in Belgium should in theory be comparable with international regulations. In the restricted collection in DRC, however, the radioactive cores were only singled out several decades later. But it is not because certain samples in Belgium were identified for removal that they were later safely stowed away, nor that the radioactive material in DRC was believed to be safe. The example shows that nothing was done to put people in Africa out of harm's way. This may have something to do with the value placed on keeping certain bodies safe from invisible harm and not others, or the possibility of doing so. And certainly, radioactive waste and danger are still dealt with differently on either side of the colonial divide (Hecht 2018).[22]

My already curious relationship to the radioactive cores in DRC was no doubt cemented by the fact that I was told at the time of my visit to the warehouse that the taped-off cores would soon leave the collection.[23] The flagging tape which would define my relation to the cores was a temporary measure to secure a distance. I would later receive confirmation remotely that the cores had effectively been removed and with them, the prospect of my ever seeing the radioactive cores evaporated.[24]

Unearthing the underground

The cores that were removed from the underground in Katanga to be studied and then shelved in a depository are now marking the collection in storage with their absence. The yellow tape is presumably no longer hanging off the shelf, for intriguingly, the collection's taped-off cores were seemingly later returned to the location from which they were initially extracted. As if they would dissolve discreetly back into the underground that they had been retrieved from? A kind of repatriation of the cores? In light of an object biography, this return marks a convenient closing of a cycle. It marks the end of their life as cores with a burial. A return of a research object to the bigger body of the underground. So far, unlike other museal items, geological objects are typically spared from repatriation debates. But this 'return' recalls the argument that items would certainly encounter a very different environment than the one they were extricated from, or in this case, the subsurface differs from the one they were extracted from at least 79 years earlier. The underground in Shinkolobwe has certainly endured massive alterations from an extensive extraction campaign that lasted several decades, built on exploitative labour conditions that left behind bigger gaps in the landscape than the missing cores could possibly fill.

The site was highly militarized between 1947 and 1957 while uranium was being exported to the United States.[25] Although the mine has technically been closed for twenty years, the site is far from inaccessible today.[26] The return of the drill cores to their mine has roused mostly bewilderment, even from earth scientists I exchanged comments with. One of them retorted: 'but which mine? The Shinkolobwe one? … If you ask me, if they do put them back there, the *creuseurs* will take them with them'.[27] *Creuseurs* is a term used generically to refer to artisanal miners, small scale subsistence miners. Formal mining by the UMHK ceased in Shinkolobwe in 1961, following Congolese independence. But the Shinkolowbe mine was only officially closed in 2007 with a presidential decree. Until then (and perhaps still now), it was (or is) artisanally mined, mostly for copper and cobalt, but not without labourers coming into contact with the radioactive minerals on site. In this sense, the cores' burial may only be temporary; they may already have come into other hands, and their covert stories still remain absent from museums.

It is significant to recall that the radioactive quality that once made the cores valuable and *use*ful is the same quality that now results in their presence being re*fused* in storage and the reason why the cores were buried. But if the cores are no longer in the collection, this does not mean that their radiation has halted, nor their contamination restrained, in the same way the life of the radioactive rock does not begin with the core's extraction from the underground. It begins much longer ago, when the cores were indistinguishable from

their surroundings, part of the bedrock. Uraninite, one of the radioactive minerals found in Shinkolobwe, is about 650 million years old (Decrée et al. 2011). As a rock, it takes time to be formed and extracted and continues to radiate well beyond a human lifetime. Thus, writing a biography of radioactive cores is a good reminder that the possibilities of the biographer, and museum curator, are always limited, in part by temporality.

I have not been able to verify how the 'return' was administered logistically, or by whom. Perhaps similar reasons explain the difficulties I kept bumping up against in efforts to access documents relative to the Shinkolobwe extraction in the colonial archives of the UMHK in Brussels. There seems to be a stark parallel between the ongoing radiation that can be recorded in Japan, difficult access to archive materials back in Belgium, and the likely porosity of the burial in DRC. The fear that documents might leak information – like the samples that leak radioactivity – comes to resemble the long-term effects of nuclear fallout. In the paper archives, this apprehension is made visible with red inked 'Confidential' or 'TOP SECRET' rubber stamps marking letters and maps of quarries. Some telegrams are even encrypted with code words. But attempts to veil history are always as partial as those to contain radioactivity and write biographies. Ironically, the red rubber stamps actually grabbed my attention as I leafed through the papers, just as the yellow flagging tape had in storage, and the blatant absence of cores does in geological museums.

Not being able to verify with any certainty the movements of the radioactive ore, then the radioactive cores, became a part of this research. What matters to me now is that the story I have been told is that the cores were buried back in Shinkolobwe. If that is because the underground is already radioactive, I can only assume that those mining for cobalt and copper in Shinkolobwe are still in contact with radioactive minerals. Here, again, other bodies come in. Long after the closure of the mine in Shinkolobwe, the gradual, lasting and detrimental effects on those working and living in the vicinity are expressed on yet more bodies. But the documentation of the effects remain rare, resulting in few measures being taken to limit human exposure.[28] The far-reaching contamination of bodies, air, water, soils, and vegetation is far more complicated to address than removing cores from a storage collection.

To conclude with a return to Haraway, writing the biography of these cores is also a way of writing about the 'profusion' of 'social interactions' that shape the underground against the grain of the silences of colonial projects, war time secrets, and the few traces kept of the burial of toxic waste and subsistence mining, too. For the museum that might mount exhibitions on mining, colonialism or world wars, this underground remains mostly buried.

Focusing on this series of cores unveils the underground as a site from which wealth is extracted *and* in which waste is disposed of too. Ultimately then, a biography of these cores, at this particular moment – of presence and then absence from the storage collection – potentially frames the cores as a biographer of sorts: a biographer of the underground. This underground that serves changing interests continues to be active if largely invisible in museums even in the post-colonial landscape of DRC, where neocolonial extraction campaigns are still being informed by the same colonial collections of cores. All four of the warehouses I visited in DRC were full to the brim with cores, each core a potential subject of a biography and biographer of its own, or a potential exhibit. The news that a further warehouse would be made available for the expanding core collection, despite some space having been made on the shelf with the removal of the Shinkolobwe cores, consolidated this impression of the ongoing expansiveness of extractive relations to the underground. The paradoxes implicit in displaying what is underground in every sense of the word remain contentious for museum practitioners as well as for geologists. Marking that absence might be a crucial first step.

Notes

1 Most recently this has been the subject of a special section entitled 'Earth as Practice' and edited by Zeynep Oguz and Jerome Whitington in *Environmental Humanities* (Oguz and Whitington 2023), in which several of these authors are assembled.

2 I prefer not to name the town so that this piece is not incriminating in any unintended way.

3 Prior to this date, from 1885, King Leopold II of Belgium established the Congo Free State

as his personal possession. In 1908 the colony was transferred to the Belgian state. My ethnographic research on the Belgian underground led me to do research in DRC. The history of Belgian reliance on the Congolese underground cannot go unaccounted for when working on the Belgian underground.

[4] To this day I do not know the cores' level of radioactivity. To know, I would have needed to get close to the core with a Geiger counter. This value (measured in sieverts) would not have yielded clarity about the lasting effects of the radioactivity on me, or on anyone else for that matter.

[5] Earth scientist (name omitted), interview by author, 17 November 2022, Belgium.

[6] Perhaps it would be more pertinent to talk about half-lives in the context of radioactive material? Half-life refers to the amount of time it takes for half of the radioactive nuclides to decay. This also means that radioactive matter is constantly changing, not stable.

[7] Confirmation for this came from those responsible for the collection. I had no other way of verifying.

[8] Daily reports of core drillings may be consulted: 'Rapport de la prospection par sondages'. Archives Générales du Royaume [AGR] 2 – Dépôt Joseph Cuvelier, Union Minière. First Series, n°2920.

[9] I see no reason to anonymize this place name, since the role of the quarries in Shinkolobwe are widely documented by historians on both sides of the Atlantic (Helmreich 1986; Buch and Vanderlinden 1995; Brion and Moreau 2006; Barbé 2014).

[10] This is in line with fieldwork such as B. Latour's (1999) work on soil scientists' samples; T. Van Dooren's (2014) among ornithologists; N. Myers' (2015) among lab biologists making protein models, to name just a few.

[11] Juridically, the UMHK was entitled to extract only tin and copper. When the UMHK argued that the copper content was too low, an exception was eventually made by the Ministère des Colonies in November 1922 and the UMHK began mining also for iron, coal, calcium, uranium and cobalt (Brion and Moreau 2006: 172). In 1963, after Congolese independence, a Congolese state entity named Gecamine was formed. UMHK continues to operate in Belgium under the name Umicore.

[12] After 1922, the processing of the ore took place in Oolen, Belgium (J.J. Derricks & J.F. Vaes, Le gîte d'uranium de Shinkolobwe. État actuel des connaissances du point de vue géologique et métallogénie [The uranium deposit in Shinkolobwe. Current state of geological and metalogic knowledge], 1956. AGR 2, Union Minière. First series, n°2918, p. 3).

[13] Jacques Thoreau & Robert du Trieu de Terdonck, Notes de synthèse: historique de la prospection et de l'exploitation [Background notes: history of prospection and exploitation], 1936. AGR 2, Union Minière. First series, n°2918; 5.

[14] I the use term uranium generically in this piece. Uranium is strictly speaking a metal, an element in the periodic table; it is produced from uranium oxide (U_3O_8), the substance that was traded. It is extracted from various minerals through chemical industrial processes. In the main uranium deposits of Katanga, uranium occurs mostly as part of the mineral uraninite (its obsolete name is *pitchblende*).

[15] See Rapport des experts 26/10/21 Commission spéciale chargée d'examiner l'état indépendant du Congo et le passé colonial de la Belgique au Congo, au Rwanda et au Burundi, ses conséquences et les suites qu'il convient d'y réserver. [Report by the experts 26/10/21 Special Commission to examine the independent state of the Congo and Belgium's

colonial past in Congo, Rwanda and Burundi, its consequences and the action to be taken in response] DOC 55 1462/002, accessible online: https://www.dekamer.be/FLWB/PDF/55/1462/55K1462002.pdf. The document specifically mentions the declassification of archival materials and is one of the only requests made by the report that have so far been met. To gain access to the company archives my request was made via the state archives and eventually granted.

16 'Mine de Shinkolobwe – Tunnel de contrôle : mesure de la radiaoactivité des berlines entièrs' [Shinkolobwe mine – Control tunnel: measuring the radioactivity of a loaded trolley]. AGR 2, Union Minière. First series, n°2925.

17 Letter, 31 October 1960, from Jesse Johnson, United States Atomic Energy Commission, Director of Division of Raw Materials Correspondence. AGR 2, Union Minière. First series, n°46.

18 Figures drawn from 'Note historique sur l'exploitation de la mine de Shinkolobwe et questions annexes' [Historical note on the exploitation of the Shinkolobwe mine and related questions] 20 May 1957 that states that, in the 15 years from 1921 to 1936, 100,000 tonnes of uranium oxide were extracted from 500,000 m^3 of matter, only a part of which was sent to the radium factory and then traded. AGR 2, Union Minière. First series, n°2598, p. 2.

19 Their uranium content was 72 per cent Congolese, with the rest sourced from Canada (Barbé 2014: 29).

20 Apparently, this large uranite block was never formally registered by the museum; it has no registration number.

21 With thanks to Florias Mees, Earth scientist and collection curator, Belgium; in conversation with the author, 17 November 2022, Belgium.

22 Hecht's work conceives of an African Anthropocene, not to propound continental essentialism but to point to forms of historical violence through uranium-bearing rocks.

23 With thanks to Albert Komba Kitenga, Earth scientist and collection manager, DRC; in conversation with the author, 14 October 2022.

24 Collection manager, DRC, personal communication, 23 February 2023.

25 Shinkolowbe became a military zone: watch towers, barbed wire and security agents guarded the site. AGR 2, Union Minière. First series, n°120.

26 For a contemporary account of a visit to Shinkolobwe, see excerpt in Zoellner (2009), chapter 1.

27 Author's translation of: '*Mais quelle mine? Celle de Shinkolobwe? … à mon avis s'ils la remettent là, ils vont repartir avec des creuseurs*', Anon., personal communication, 20 April 2023.

28 The primary toxic effects of uranium on the human body are on bone and kidney function. The Assessment Mission of the Shinkolobwe Uranium Mine, Democratic Republic of Congo November 2004 compiled by the UNEP / OCHA Environment Unit, focuses on radioactivity; for later studies, see Banza et al. (2009). The latter reports levels of other metals in the local populations' urine. Photos of the 2004 UN mission emphasize measurements rather than engaging with the effects and symptoms resulting from exposure: The New Humanitarian, Photo Library 2024. https://www.thenewhumanitarian.org/photo-library?search_api_fulltext=Shinkolobwe&field_report_region=&field_report_theme=&created=&created_1=, accessed 5 May 2024.

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