Fictional Technologies of Collaboration

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ABSTRACT: Recent works of speculative fiction from Africa and the African Diaspora portray imaginative technologies, providing a lens through which to reconsider the concept of collaboration as it relates to African historical contexts. This article analyzes depictions of collaborative technologies in the novels *Nigerians in Space* by Deji Bryce Olukotun (2014), *The Hangman's Replacement: Sprout of Disruption* by Taona Chiveneko (2013), and *Zoo City* by Lauren Beukes (2011), emphasizing how the texts reflect upon histories of industrialization, mining, and bioprospecting in eastern and southern Africa. Through a reading of these works, the article emphasizes how collaboration around technological projects can take unexpected forms, can involve the supernatural, and can have unanticipated, and sometimes positive, effects. Technologies often emerge in strange, uncertain spaces where unequal actors come together and intersect with unseen or unpredictable forces. Ultimately, forms of collaboration in these novels emphasize the aspects of loss and risk, as well as possibility, that emerge from technological projects in the context of histories of inequality and disenfranchisement.

Introduction

Deji Bryce Olukotun's 2014 novel *Nigerians in Space* depicts an imaginary response to the frequent power outages in South Africa's second-largest city, Cape Town. The response is a "moonlight lamp" created by Dayo, a young American man of Nigerian parentage who grew up in South Africa. As Dayo attempts to sell the lamp to an uninterested store owner, readers learn exactly how this lamp functions:

> There were three main sections: a black plastic conical base with an
> inlaid full spectrum bulb and a magnet; a water-filled globe resting

NOTE: THESE ARE UNCORRECTED PAGE PROOFS. NO IMAGES HAVE BEEN INCLUDED.

upon the base containing pure silicate sand and a figurine of a cat;
and a tiny array of solar cells ringing the top of the globe. When the
magnet rotated in the base, the cat spun on its axis, its tail function-
ing as a stirrer to spread around the sand. The bulb shot light into
the globe, which refracted off the sand in the water.[1]

In this passage, Olukotun highlights the intricacies of Dayo's lamp. It con-
tains several distinct parts that function effectively together: the bulb, the
magnet, the snow globe with sand in it, and the solar cells. The lamp evokes
South Africa's history of unequal electrification, which is just one example
of colonialism and apartheid's systematic racism. At the same time, be-
cause the moonlight lamp harnesses the moon's power, it suggests that
supernatural forces can be important to the lived experience of technology.
Although a tie between the supernatural and the technological is not exclu-
sively relevant to those on the African continent, novelistic depictions of
this relationship offer a strategy for expressing agency and imagining
opportunity despite and through historical and contemporary experiences
of disenfranchisement. Accordingly, Nigerian-American Olukotun is one
of several contemporary writers in Africa and the diaspora who are using
speculative fiction to address the history and future of technology and
modernity in African spaces.[2]

Objects like the moonlight lamp point to the concept of "collabora-
tion" as understood here, which occurs when individual actors contribute
parts to a project that gain meaning only in the context of the whole. These
actors may be human or non-human: contributors to the lamp include
both Dayo and the mysterious powers of the moon. The lamp, unbe-
knownst to Dayo, works due to the presence of actual moon dust and has
numerous mysterious effects. Collaboration, because it can involve the
participation of those with diverse backgrounds, positions, and motiva-
tions, carries with it an element of risk and may have unpredictable out-
comes, whether positive or negative. In *Nigerians in Space*, the moonlight
lamp positively affects an abalone crop and Dayo's neighborhood but is
also tied to a failed (and ultimately deadly) collaborative project called
Brain Drain, explored later in this article. Following Clapperton Mavhun-
ga, technological practice can include interaction with spiritual and super-
natural realms; technology takes on significance as individuals "assign it
meanings and functions as a means . . . *of performing specific projects* of
their own."[3] In addition to the imaginative technologies of *Nigerians in*

1. Deji Bryce Olukotun, *Nigerians in Space*, 157.
2. In addition to Taona Chiveneko and Lauren Beukes, who are also examined in
this article, other writers include, for example, Nnedi Okorafor and Lesley Nneka
Arimah.
3. Clapperton Mavhunga, *Transient Workspaces*, "Technology in Africa, Africa in
Technology." Italics in the original. In this section, Mavhunga also acknowledges the
potential risk of a definition of technology so broad as to apply to anything. He argues

Space, other novelistic representations of technology explored here include supernatural animal symbionts with various abilities and genetically modified plants that can find buried corpses.

This study is not, of course, without its precedents. Rosalind Williams, writing in *The Triumph of Human Empire*, insists that nineteenth century European writers Jules Verne, William Morris, and Robert Louis Stevenson "turn[ed] to literature as a supremely sensitive register of historical change and as a source for understanding."[4] Indeed, the literary form provides particular room to experiment with and reflect on the way humans tell stories and experience the world.[5] A novel may, for example, contain narration from multiple, contested perspectives, which makes visible not just the writers' own practice but also the way historical narratives are themselves made and remade.[6] For historians of technology, speculative and science fiction novels (such as those Williams studies) can facilitate a particular consideration of teleologies of progress and how people's daily lives intersect with technological change and narratives surrounding it.[7] These insights become particularly significant when considering African spaces because peoples on the African continent have long been excluded as subjects in Euro-American narratives of technological progress and modernity.

Examining contemporary African and Afro-diasporic novels in the context of the history of technology also intersects with longstanding debates among African studies scholars about the relationship between literary and historical research.[8] If the novel is understood as an originally European literary form, analyzing a novel from Africa as a freestanding aesthetic object without any attention to the specific locations and contexts surrounding its creation risks missing significant aspects of the text. On the other hand, humanities and social science scholars in North America have at times overburdened African literature with the ability to represent "real" life and history, thus not fully considering writers' formal and symbolic practices. Such concerns need not be limited to the study of African litera-

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that it is nonetheless necessary to complicate "Western-centric" understandings of technology that might exclude some individuals and practices.

4. Rosalind Williams, *Triumph of Human Empire*, 347.

5. Nana Wilson-Tagoe, "History, Gender, and the Problem of Representation," 140.

6. Ibid. Wilson-Tagoe, explains that literature reveals "the way human beings construct, maintain and contest relations with their worlds and with one another."

7. A lengthy discussion of genre definitions is beyond the scope of this article, but the works that Williams studies are early examples of the science fiction genre in Europe. The African-associated works examined here have elements of both fantasy and science fiction and are best understood as "speculative" for my purposes; though specific in many ways to the contexts in which they were written, these novels also share literary history with the novels in Williams's study.

8. These debates have recently been explored and invigorated by the articles in *The Locations and Dislocations of African Literature*, edited by Eileen Julien and Biodun Jeyifo. I draw specifically here on Julien and Jeyifo's introduction.

ture and could well be applied to literary research associated with other spaces with institutional histories similar to that of African studies, emerging in part from North American area studies programs of the Cold War era. Writing about the relevance of literary study to historians of technology, Martin Collins argues, "[T]here is merit in bringing literature and the history of technology into critical conversation, especially as regards questions of method."[9] Such questions of method are particularly important, given the disciplinary concerns described above. How can we understand the ways that African literature speaks to experiences of technology? This study reads three imaginative novels from Africa and the African diaspora not for a direct representation of historical experience (importantly, none of the novels examined are set in the past and are instead set in alternative presents and futures) but for the ways that the texts utilize speculative and science fictional elements to provide an expanded view of technological experience.

This article begins with an examination of "collaboration" as it relates to the history of knowledge production in Africa and collaboration as it relates to digital media and communication. This discussion is followed by an analysis of collaborative technologies as presented in three relatively recent works: *Zoo City* by well-known South African writer Lauren Beukes, *The Hangman's Replacement: Sprout of Disruption* by pseudonymous Zimbabwean writer Taona Chiveneko, and the already-mentioned *Nigerians in Space* by Olukotun. Each work provides a different measure for the ways collaboration is expressed and understood in several African contexts, written from perspectives both within and outside of the African continent. These varied cases are purposeful in that they all provide different registers for experiences of collaboration and technological change, with a focus on loss, risk, and possibility, respectively. In the dystopian Johannesburg of Beukes's 2011 *Zoo City*, humans and animals work together in symbiotic pairs. Collaboration occurs where interspecies communication and technology intertwine and is accompanied by the potential for loss, as conveyed by the intense pain that occurs when the animal-human pairs are separated. *The Hangman's Replacement*, self-published by Chiveneko in 2013, presents imaginative technologies that pose a threat to state power through a strain of genetically engineered flame lilies that resist control and can seek out and consume buried human corpses. And in Olukotun's 2014 *Nigerians in Space*, the moonlight lamp, among other objects, demonstrates how collaborative projects can take various forms, can involve the supernatural, and can have unexpected, and sometimes positive, effects. This understanding of collaboration emphasizes that technologies often emerge in strange, uncertain spaces where unequal actors come together and intersect with unseen or unpredictable forces. This is not incidental but in fact integral to the way we can understand technology. Ul-

9. Martin Collins, "Editor's Note," 227.

timately, forms of collaboration in these novels emphasize the aspects of loss and risk, as well as possibility, that emerge from technological projects in the context of histories of inequality and disenfranchisement.

Technologies of Collaboration

The term "collaboration" for historians of Africa often appears in examinations of colonial-era intermediaries, such as informants, translators, and functionaries who participated in European diplomatic, economic, and information-gathering practices throughout the continent. Collaboration is thus discussed in terms of how Africans participated in European knowledge production about (and ruling of) Africa by providing critical knowledge, serving as go-betweens, and acting in necessary administrative roles. In *Africanizing Anthropology*, Lyn Schumaker demonstrates collaboration's role in the history of anthropological knowledge in particular, indicating the influence and genuine interaction that can come from potentially contested group projects—in this case, the anthropological research of the Rhodes-Livingston Institute (RLI) in what is now Zambia. Schumaker demonstrates how research assistants helped shape and produce British anthropologists' work and became critical to the information that the RLI produced.[10] The complexity that Schumaker calls for in her understanding of collaboration and colonial-era knowledge production is echoed in the volume *Intermediaries, Interpreters, and Clerks: African Employees in the Making of Colonial Africa*, edited by Benjamin N. Lawrance, Emily Lynn Osborn, and Richard L. Roberts. In their introduction, Lawrance, Osborn, and Roberts point out the duality associated with the term "collaboration," which essentially connotes the act of "working together" but after WWII takes on a negative connotation related to involvement with the Nazi regime.[11] Given the latter connotation, collaboration could be seen in opposition to resistance, a differentiation that Lawrance, Osborn, and Roberts challenge via research into the figure of the intermediary.[12] More recent scholarship continues to look at in-between figures to examine colonial rule and knowledge production in Africa.[13] Additionally,

10. Schumaker explains, for example, that the research produced by the RLI "is not simply a product of Western thought brought to bear upon African societies but is itself a product of Africa." Lyn Schumaker, *Africanizing Anthropology*, "From History of Anthropology to Historical Ethnography."

11. Benjamin N. Lawrance, Emily Lynn Osborn, and Richard L. Roberts, "African Intermediaries and the 'Bargain' of Collaboration," 6. This dichotomy, particularly as it relates to the World War II-era sense of "collaboration with the enemy," is echoed by the recent theorists of open-source practices discussed later in this section.

12. Ibid., 6–7.

13. Ralph A. Austen, "Colonialism from the Middle"; Jeremy Rich, "'White Coronations and Magical Boycotts'"; John Parker, "Dynamics of Fieldwork Among the Talensi."

work such as Abena Dove Osseo-Asare's on the history of healing plant knowledge in African countries and global pharmaceutical development in *Bitter Roots* demonstrates how skill and information do not always emerge from one clear source or an individual moment of discovery, rending the work of "intermediaries" even more central as knowledge circulates and changes in both continental and global contexts.[14] Studies of collaborative figures and work enable historical research to push against dichotomies of the colonizer and the colonized or the researcher and the informant; however, resistance to the supportive role of intermediary can still be seen as integral to anti-colonial movements.[15] In other cases, colonial-era intermediaries became central political figures at independence, as in the Congo.[16] Such theorizations of collaboration and those individuals seen as "collaborators" in the post-WWII sense of the term (whether to their individual benefit or not) inform this study's discussion of collaboration, which uses literature to complicate and render visible the affective nuances of collaborative work and its technological outcomes.

As the collaborative potentials for new technologies, particularly in developing nations, are touted more and more, the term collaboration as understood here also draws on discussions of open-source software, digital media, and communication.[17] This type of collaboration, as The Contributors to the open-access book *Collaborative Futures* explain, occurs when distinct individuals contribute parts to a project that, when separate, cannot easily stand on their own.[18] In terms of Web-based works, Wikipedia and other Wiki projects are consummate examples of collaboration in this sense. When multiple parts are brought together in such projects, however, "collaborative action can have more than one intent, [and] it can also have more than one repercussion. These multiple layers are often a source of conflict and confusion."[19] Understood in this way, open-source collaboration is not so far in implication from colonial and independence-era "collaborative" projects in Africa. That is, power and possibility are available in collaboration but often at risk; this risk is perpetuated even in creative digital projects that make use of new technologies. For example, The Contributors to *Collaborative Futures* address the complexity of pro-

14. Abena Dove Osseo-Asare, *Bitter Roots*, 12; 16.

15. Meredith Terretta, "Chiefs, Traitors, and Representatives."

16. Martin Klein, "African Participation in Colonial Rule," 283.

17. For examples, see the run-down of articles on telecommunications infrastructure in Africa in 2015 by Steve Song, "Africa Telecoms Infrastructure in 2015," *Many Possibilities* (blog), January 13, 2016, https://manypossibilities.net/2016/01/africa-telecoms-infrastructure-in-2015/.

18. *Collaborative Futures* is a truly collaborative text-in-progress to which anyone can, theoretically, contribute; some of the core writers are Adam Hyde, kanarinka, Mike Linksvayer, Michael Mandiberg, Marta Peirano, Sissu Tarka, Astra Taylor, Alan Toner, and Mushon Zer-Aviv. Because the copyright is held by "The Contributors," I have opted to use this to refer to the authors of *Collaborative Futures* throughout this article.

19. The Contributors, *Collaborative Futures*, 58.

ducing works in potential collaboration with an enemy in the context of a joint Israeli/Palestinian art project, wherein "the term [collaboration] itself was not only contested, it was outright dangerous."[20] This observation addresses the very real dangers that arise when those of diverse origins or diverse purposes contribute to a work. In social media, unanticipated forms of collaboration, in which online videos might be repurposed and used in alternative contexts, likewise pose risks to artists and other creators.[21] On the other hand, open-source projects offer the potential to dismantle power structures, particularly in the way that the archive is constructed and understood. Enrique Martino suggests, "It is only when sources begin to circulate in democratic digital spaces, freed from professional representatives and gatekeepers, historians and archives, that the website becomes productive of new audiences and destructive of neocolonial writing and research practices," and though he is cautious to qualify this, Martino insists upon the possibilities of open-source figurations.[22] However, recent discussions of apparently open projects like Wikipedia insist that they are not as transparent and participatory as they may appear.[23] The contemporary moment, wherein collaborative projects are at once used to open up knowledge about (and from) Africa as well as called into question for being always already co-opted introduces the question of how to understand collaboration at the intersection of African studies and the history of technology. Sheila Jasanoff's theory of co-production usefully insists upon a study of science and technology that incorporates the importance of the socio-political realm via "mutually supporting forms of knowledge and forms of life."[24] While this is useful, the term "collaboration" is favored here because of its rich historical valences and its connections to contemporary digital projects—from experimental films to the ever-present Wikipedia—that shape how we view the world today. In African literature, there are examples of creative rewiring to access electricity and community housing adapted to rising sea levels.[25]

Williams suggests that works of narrative fiction might serve as "lantern-bearers" for the lived experiences of technology, providing insight into a technology-user's subjective "inner world."[26] Taking a cue from

20. Ibid., 58.

21. For further discussion of the risks of social media projects in both African studies and media studies contexts, see Mahriana Rofheart, *Shifting Perceptions of Migration*, 118–19.

22. Enrique Martino, "Open Sourcing the Colonial Archive," 388.

23. See Nathaniel Tkacz, *Wikipedia and the Politics of Openness*, and Alice E. Marwick, "Open Markets, Open Projects."

24. Sheila Jasanoff, "Beyond Epistemology," 297.

25. The former is important to both Olukotun's *Nigerians in Space* and to Beukes's *Zoo City*. The latter, though not explored here, is an increasingly common theme and present in many stories of the volume *Lagos_2060* edited by Ayodele Arigbabu.

26. Williams, "The Lantern-Bearers of the History of Technology," 263.

Williams, this article uses narrative fiction to interrogate varied (often un-equal) technological livelihoods. The sections that follow thus turn to the novels themselves to examine how contemporary writers imagine both seen and unseen aspects of collaborative technological practices.

Industrialization and Loss in Southeastern Africa: *Zoo City*

Lauren Beukes's speculative novel *Zoo City* is set in Johannesburg, South Africa in a dystopian near future. Beukes, a white South African, uses the speculative fiction genre to think creatively about the nation's fraught history of racial inequality and to consider its future. Her novel's world has a history that diverges from our own in the late twentieth cen-tury when, for unknown reasons, every human responsible for the death of another suddenly acquires an animal companion and a supernatural abil-ity. *Zoo City*'s protagonist and narrator is a young woman named Zinzi, who, responsible for her brother's death, now has a sloth animal compan-ion and the supernatural ability to locate lost objects. She earns money finding people's lost items, but when she takes a missing persons case, she encounters a dangerous underworld of criminals who are killing people's animal companions to release powerful magic. This crime is particularly terrifying because the death of an animal causes horrible pain for the human half of the human-animal pair. The novel follows Zinzi while she and her Sloth investigate the missing persons case and interact with other human-animal pairs, some of whom threaten their lives.[27]

The slum-like "zoos" where the "animalled" live, such as the epony-mous Zoo City that Zinzi calls home, reflect South Africa's history as an industrial center that has excluded much of its population's access to in-dustry at various historical moments and into the present. In *Zoo City*, we can read technology and collaboration in the work of the animal-human pairs, who together produce objects and develop skills of unique power and ability. Additionally, the sense of loss and danger that accompanies contributions to collaborative work in unequal spaces appears through the profound physical and psychological pain, termed the Undertow, that accompanies the separation of a human-animal pair.

Animals and other non-humans can certainly participate in collabora-tions, as Michel Callon's classic examination of the interaction between scallops, fishermen, and researchers of St. Brieuc Bay demonstrates. He in-sists upon the importance of non-humans as valid contributors, as well as upon the unpredictably of a situation in which members of any one of the three groups (scallops, fishermen, researchers) might alter their patterns of behavior.[28] While Callon continually pushes against any possibility of an-

27. The animals' names are typically capitalized in the text, a practice I will follow for the rest of my analysis.

28. Michel Callon, "Some Elements of a Sociology of Translation," 15–17.

thropomorphizing the scallops, despite their agency, the speculative genre in *Zoo City* provides more room for non-human actors' anthropomorphic qualities.[29] This underscores individuals' lived experiences and the risks they take to participate in collaborative projects and research, which matters in the context of South Africa's history of mining and industrialization, wherein individuals' ties to the symbols of industry (and by extension, symbols of the modern) were continually undercut even when those individuals were intimately engaged with industry's raw materials in gold, copper, and uranium mines. Understanding the power of *things* as presented in *Zoo City* via the relationships in the animal-human pairs, as well as the profound sense of loss that occurs when cut off from those things, helps address the centrality of all kinds of work, even work that has at times been seen as peripheral to industrial development.

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The novel's setting in Johannesburg is significant given the city's role in the history of industrialization, as well as its position as a symbol of modernity in South Africa and across the continent.[30] Johannesburg is, as Achille Mbembe and Sarah Nuttall suggest, "the symbol par excellence of the 'African modern.'"[31] Electricity is one aspect of Johannesburg's infrastructure that, like much else in South Africa's history, is tied to the history of mining.[32] First, the mines were electrified by necessity to see inside deep shafts, and Johannesburg received electric street lighting shortly thereafter in 1891.[33] The symbol of an electrified Johannesburg stands out, as demonstrated by Nelson Mandela's descriptions of the city as "a vast landscape of electricity, a city of light,"[34] but in the history of this electrification, domestic lighting was initially limited to white users.[35]

Mine work and its associated developments, such as electrification, thus carries with it a possibility for connection to the broader world and to industrial development, but it also carries with it enormous risk. In *Being Nuclear*, Gabrielle Hecht explains that in South Africa, apartheid elites "[excluded] black Africans from scientific and technological knowledge."[36] Mineworkers (both black and white) were not seen as full participants in the industrial process and its aftermath, to the ultimate detriment of their

29. Ibid., 25n24; 26n39.

30. It should be noted that the appearance of the animal symbionts in *Zoo City* is global, but the story is set in Johannesburg, with some reference to circulations in eastern and southern Africa.

31. Achille Mbembe and Sarah Nuttall, "Introduction: Afropolis," 1; 16.

32. Gabrielle Hecht confirms, for example, "The history of modern South Africa was profoundly shaped by mining," and the passbook system that was integral to apartheid rule was, for example, initially used for control of mineworkers. Hecht, *Being Nuclear*, 251–53.

33. Julia Hornberger, "Nocturnal Johannesburg," 287.

34. Nelson Mandela, quoted in Jonathan Hyslop, "Gandhi, Mandela, and the African Modern," 132.

35. Hornberger, "Nocturnal Johannesburg," 287.

36. Hecht, *Being Nuclear*, 19.

health. Considering such workers as collaborators, however, helps reassert their engagement in these processes. The separation between mineworkers and the technology they helped produce continued after apartheid, wherein those in government or industry alternatively made visible or invisible the "nuclearity" of South African mines—and their effect on mineworkers—as they saw fit, without regard to the human cost of exposure to uranium and its related materials.[37] Hecht insists that even though mineworkers were frequently disassociated from "nuclearity" during research into the effect of uranium mining, the miners did still influence (or collaborate in) these processes.[38]

In addition to the physical consequences of direct engagement with mining *things*, a sense of loss and absence emerges when the promises of association with these things are not borne out. This is the subject of James Ferguson's research on miners in the Zambian Copperbelt in *Expectations of Modernity*. Ferguson asserts, "the Copperbelt's mining industry symbolized and epitomized a metallic, mechanical, industrial modernity as nothing else could," and the mineworker became the particular symbol of this kind of modernity.[39] However, industrial modernity's promises never materialized for many mineworkers. Importantly, Ferguson describes the failed expectations of modernity "like the phantom pains from a limb long ago amputated," which is precisely where the human-animal pairs in *Zoo City* come in.[40] Like the mineworkers in southeastern Africa's gold, uranium, and copper mines, the human-animal pairs participate intimately in technological processes, and the loss when this collaboration is disrupted takes literal form in the Undertow.

The portrayal of Johannesburg in *Zoo City* clearly engages with the legacy of Johannesburg's industrial past. The novel opens with a reference to mining and industrialization from Zinzi's perspective: "Morning light the sulphur colour of the mine dumps seeps across Johannesburg's skyline and sears through my window."[41] Zinzi has also fashioned apartment furniture out of found objects and crafted ways to obtain internet service and electricity in her Zoo City apartment. Furthermore, she and other tenants "[share] illegal hook-ups, jerry-rigged wiring running between flats, sometimes between buildings—flaccid tightropes for a decrepit circus."[42] Zoo

37. Ibid., 248.
38. Ibid., 21.
39. James Ferguson, *Expectations of Modernity*, 35.
40. Ibid., 238.
41. Lauren Beukes, *Zoo City*, 7.
42. Ibid., 64. Darkness in the context of Johannesburg's history of electrification and mining is further emphasized when Zinzi ends up beneath the city where "[t]he tunnels are a scramble of pitch-black termite holes, some of them narrowing away to nothing, like whoever was digging them got bored and wandered off. The original gold diggings maybe, when Johannesburg was still just a bunch of hairy prospectors scrabbling in the dirt," 212.

City's inhabitants must modify technology's leftovers to suit their needs in precarious surroundings.

Against the backdrop of disintegrating urban projects, human-animal pairs function creatively together, which is where the concept of collaboration enters this analysis of *Zoo City*. Most simply, the human-animal pairs work together to generate a particular skill or ability, as with Zinzi and her Sloth locating lost items. Both members of the pair contribute to the process, and a person's skill cannot function independently of the animal. To deepen the connection to technology, some human-animal pairs create products and tools, such as Zinzi's Zoo City neighbor who has a "talent" for creating objects with "anti-theft charm[s] woven" into them.[43] Narrator Zinzi uses the word "talent" here, which underscores that the work the human-animal pairs do is associated with skills (such as weaving), tools, and products, though the products have magical or mysterious qualities.

The language of tools and technology is also employed to describe the animals themselves. While Zinzi initially hides her Sloth because it serves as a marker of guilt about her brother's death, she encounters others in her apartment building who are proud of their animals: "the men in the lift didn't carry their animals like burdens. . . . They carried them the way other men carry weapons."[44] While an animal on its own might not be a technology, these animals are described as "weapons."[45] Importantly, explanations for the phenomenon of the animalled range from the result of nuclear test fallout to a sign of eternal damnation.[46] The animals themselves might, in fact, be genetically modified, either purposefully or accidentally. In this way, the very origins of the human-animal collaborations could be related to technology just as much as to magic or cosmology.

The intersection of technology and magic in a context of collaboration between human-animal pairs takes on greater significance given the specter of loss that accompanies these collaborations. Just as Ferguson describes the effects of the failure of modernity's promises to materialize in the Zambian Copperbelt as "a phantom limb," the unbearably painful Undertow comes when human-animal pairs are separated from each other in *Zoo City*. The Undertow, like the animals themselves, is unexplained but potentially tied to a range of spiritual and technological sources. When the Undertow emerges after an animal dies or is taken away from its respective human, "The air pressure dips, like before a storm. A keening sound wells up soft and low. . . . It swells to howling. And then the shadows start to drop from trees like raindrops after a storm. The darkness pools and gath-

43. Ibid., 69.
44. Ibid., 62–63.
45. This becomes even more interesting when considering Clapperton Mavhunga's study on the intersection of weapons, hunting, and spirituality in Zimbabwe. See Mavhunga, *Transient Workspaces*.
46. Beukes, *Zoo City*, 71; 133.

ers and then seethes."[47] This passage emphasizes a sense of being haunted with the words "keening," "howling," and "shadows." All individuals with animals fear the Undertow, which causes extreme pain and eventual death. The Undertow's danger also looms in *Zoo City* because of the criminals who are stealing and killing animals to make *muti* [medicine].[48] If we understand *Zoo City* as depicting the after-effects of technological processes and the human-animal collaborations as themselves connected to technology, then this deadly manifestation of loss can be tied to the experiences of abjection and danger that accompany the lives of individuals in southeastern Africa like mineworkers, integral to technological processes but often excluded from them both historically and into the present.

The relationship between the humans and animals is critical to the way *Zoo City* functions. For example, Henriette Roos reads *Zoo City* alongside nature writing and representations of the apocalypse but importantly notes that in the place Zoo City the "boundaries between human and non-human" are "changeable," even though other physical boundaries appear strictly enforced.[49] Personification in Beukes's writing manifests literally through the animals, whose physical and emotional states are tied to those of their corresponding humans.[50] Zinzi explains, for example, that she cannot leave her Sloth behind because "the feedback loop of the separation anxiety is crippling."[51] This is a representation not only of different ways humans might understand the physical world around them, as Roos suggests, but also of a way to understand collaboration and how we experience collaborations with objects, effects, beliefs, and technologies. Nancy Armstrong explains that Zinzi's Sloth helps her navigate her surroundings and attunes readers "to the cognitive activity that enables human beings to negotiate a material environment that otherwise would surely let us die."[52] In the context of southeastern Africa and its history of mining, these methods become especially important. Collaboration can be a necessary and strategic aspect of survival in a dangerous world but can also carry enormous risk. The Undertow in *Zoo City* represents the loss—which might be felt very deeply, as Ferguson suggests—that occurs when collaborative technological projects do not go as planned or do not bear out the promises with which they are associated. At times, these collaborative projects can even pose risks to state power in their unpredictability, and that is where we turn to examine collaboration and bioprospecting as presented in *The Hangman's Replacement*.

47. Ibid., 236.

48. Beukes uses a Shona word here, as elsewhere, which further engages the text in the context of broader southeastern African thought systems. This also facilitates connections to Mavhunga's research on technology and spirituality in Zimbabwe.

49. Henriette Roos, "Relocating the Boundaries," 58.

50. Ibid., 61.

51. Beukes, *Zoo City*, 142.

52. Nancy Armstrong, "The Affective Turn," 463.

Bioprospecting and Risk in Zimbabwe: *The Hangman's Replacement*

The Hangman's Replacement by Chiveneko occupies an interesting space in digital publishing and contemporary technologies. It is a self-published work available for purchase in print and e-book.[53] After its publication, *The Hangman's Replacement* gained some attention online among those who review speculative or independent fiction.[54] If literature can shed light on experiences of technology, then it is appropriate to approach those experiences from a variety of angles. Chiveneko, writing under a pseudonym and publishing for himself, is free (both politically and imaginatively) to suggest the ways that open-source practices and collaboration might serve to unravel the stability of the Zimbabwean state, particularly when these practices intersect with unseen forces.

The Hangman's Replacement has numerous intertwined storylines, but the one most relevant to an understanding of collaboration is that which surrounds a strain of genetically engineered flame lilies that can seek out and consume buried corpses.[55] This development is disconcerting to government officials who do not want their past misdeeds unearthed by the plants. A lawyer named Giorgio Gweta is hired, and he in turn hires Professor Khupe, a biologist who discovered the plants growing in the Great Zimbabwe ruins.[56] Gweta wants Khupe to create a stronger and more precise strain of the plants, thus enabling Gweta's law firm to file a patent on behalf of his clients.[57] The patented version would prevent others from developing their own enhanced strains, but before Khupe can finish his work, the original carnivorous flame lilies adapt on their own, becoming stronger and better able to identify human corpses, much to the horror of Gweta's clients. Importantly, the plants' DNA is interwoven with human DNA, which Khupe describes as something that "only happens in botanical

53. I first encountered this novel on the website *Goodreads*, where the author was providing advance copies of the book. I have had personal communications with the pseudonymous author via this platform.

54. See, for example, reviews in *The Indie Reader*, May 16, 2013, http://indiereader.com/2013/05/the-hangmans-replacementsprout-of-disruption/; *Kirkus*, February 22, 2013, https://www.kirkusreviews.com/book-reviews/taona-dumisani-chiveneko/the-hangmans-replacement/; and *Read Dream Relax*, April 18, 2013, http://www.readdreamrelax.com/book-review-the-hangmans-replacement-sprout-of-disruption-by-taona-dumisani-chiveneko/. Most of these reviews are from the spring of 2013 when the book was initially published, and the author was actively seeking reviews.

55. The novel's title, *The Hangman's Replacement*, refers to Zimbabwe's search for a new executioner, which, though interesting, is not directly relevant to my study.

56. Great Zimbabwe is the location of ancient ruins in southeastern Zimbabwe. There has been much research into its origins and significance; see, for example, Thomas N. Huffman, "Debating Great Zimbabwe."

57. The clients are understood to be government officials, though they are never directly identified.

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mythology."[58] In this comment, the imaginative and the real intertwine; the carnivorous flame lilies are the stuff of legend, but the combination of mythical and scientific practices has allowed them to come into being and to proliferate.

This plotline, however speculative, intersects with the history of plant knowledge and bioprospecting for pharmaceutical resources that has occurred across African regions in the twentieth and twenty-first centuries. Bioprospecting involves, in this case, the search for and harnessing of plants with medicinal and other beneficial properties; such endeavors often involve collaboration between local and non-local knowledge producers. As Osseo-Asare demonstrates in *Bitter Roots*, it is often difficult or impossible to identify a single point of origin for or single creator of specialized healing plant knowledge. Osseo-Asare argues that this context "[complicates] claims to priority in science and traditional medicine."[59] But while the vision of open-source access to healing plant knowledge may seem appealing, these kinds of collaborations—like so many others—are complex and fraught with risk. Osseo-Asare demonstrates how in some cases a British scientific "open-source" structure for information sharing during the colonial era undermined the viability of individual African researchers and organizations.[60] Osseo-Asare's research provides a framework through which to read the risks and possibilities of collaboration around powerful plants in *The Hangman's Replacement.*

There is also a long history of research into plant poisons used for arrows, which are at once dangerous, technological, and collaborative in much the same way that the genetically modified flame lilies are in the Zimbabwe of *The Hangman's Replacement.* Mavhunga, writing of Zimbabwe as well, examines the role that arrow poisons had in technologies associated with hunting that frequently engaged spiritual realms.[61] Much like Osseo-Asare's research but with more emphasis on unseen (spiritual) components, Mavhunga explains, "The forest was . . . a pharmacy for the treatment of all kinds of health conditions."[62] Plant knowledge and the collaborations that emerge around that knowledge have been integral to the way that scientists, healers, and hunters in several African regions have interacted with both colonial and state forces. Given this context, as well as the history of economic disenfranchisement in Zimbabwe, *The Hangman's*

58. Chiveneko, *Hangman's Replacement*, "ZUVA REDU: Cadaver-Hunting Flower Found at Great Zimbabwe."

59. Osseo-Asare, *Bitter Roots*, 69.

60. Osseo-Asare traces bioprospecting in several African countries, including Ghana, South Africa, and Madagascar. Because of her vast research, she is able to point towards certain patterns that emerge across Africa, while acknowledging situations that are also specific to each location.

61. Mavhunga, *Transient Workspaces*, "Handheld Weapons."

62. Ibid., "The Forest as a Space of Ecological Education." Osseo-Asare likewise devotes a chapter of *Bitter Roots* to arrow poisons in Ghana.

Replacement demonstrates the potential power and danger of open-source collaborations around plants.

In the novel, knowledge and innovation pose a direct threat to state authority, and intellectual property regulations provide a way to restrict that innovation. Gweta is charged by his clients with controlling the development of the carnivorous flame lilies at any cost. Gweta explains to Khupe:

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> Whoever developed these flame lilies planted them anonymously. He did not bother to file for a patent. . . . By planting the vines at Great Zimbabwe, [he] disclosed the invention. This disclosure was broadcast to the world when you decided to grant [a magazine interview]. All this happened before the inventor filed for a patent. Even if he decides to do so now, the disclosure of the invention may mean that the genetic breakthrough can no longer be patented. At the very least, we can patent our improvements on the baseline technology.[63]

Here, the flame lilies serve as a figure for collaboration on several counts. First of all, the plants might inform upon the government or anyone with buried secrets because of their potential ability to locate human corpses. As such, they pose a threat to state power. Gweta hopes to use scientific innovations to take further control of the plants, thereby co-opting them to the government's side. The plants thus occupy an intermediary space, and what secrets they could reveal is initially uncertain. Most importantly, the plants represent the ways that technology intersects with collaborative forces in contemporary contexts. With the discussion of patents, the situation depicted in the passage is clearly engaged with debates about intellectual property. While Gweta seeks to limit the plants' powers, the plants' developer intends for them to spread, grow, and change, perhaps spurring other inventions and improvements. This is indeed a form of collaboration. Professor Khupe explains that the plants' creator "left the grunt work of improving his invention to lesser minds. . . . That is why he planted the flowers in a place he knew that someone like me would discover them. Great Zimbabwe is a popular area with ethno-botanists."[64] These carnivorous plants are a collaborative work let loose to expand in the world, however seemingly nefarious the potential outcome. Chiveneko's representation of the plants in this way suggests an intersection with "collaboration" in the sense of open-source technologies that allow for the input, perhaps unexpected, of multiple creators and "collaboration" as already co-opted: the informant who reveals secrets to one side or another. The genetically modified flame lilies, though imaginary, thus point to the implications and uses of collaborative works in a context where state power seeks to control unpredictable knowledge.

In *The Hangman's Replacement*, the plants themselves also symbolize a

63. Chiveneko, *Hangman's Replacement*, "The Patent."
64. Ibid., "The Urgency of a Stifled Intellect."

desire to persist despite difficult circumstances. They have a tenacious sur-
vival and adaptation instinct; they seek out nourishment in the form of
mammalian corpses and can survive in the most undernourished soil. The
plants have further symbolic value because they threaten to disrupt state
structures: the novel's subtitle is "The Sprout of Disruption." The plants
are singularly bent on uncovering hidden corpses and even release a
unique pollen that, combined with the figure of the *ngozi* (an avenging
spirit in Shona and other belief systems), threatens to go a step further than
finding the corpses to identify the original murderers. The reference to the
ngozi also points to the complex ways that technology is experienced. In-
dividuals experience technologies layered upon their existing understand-
ings of the world, and speculative literature allows for a literal depiction of
that process. In this case, the genetically modified plants function in coop-
eration with actual *ngozi* powers.

The plants' creator later reveals himself and explains how he con-
structed the plants' genetics by scouring the globe for different compo-
nents including "extraordinary motivation"—his own sort of bioprospect-
ing.[65] Though causing havoc in Zimbabwe, the plants' origins are global
and cannot be tied to one distinct location. Most importantly, the plants in
The Hangman's Replacement threaten to unleash confusion and uncer-
tainty; this uncertainty can *only* be stopped by limiting future collaborative
possibilities through the use of existing patent law. As Gweta's unnamed
client puts it, "do everything you can to use the patent system to prevent
the spread of this demonic vine. Make sure you cover all possible varieties
of the plant."[66] Technology that allows for (and perhaps was constructed
with the intent of) open-source collaboration thus becomes very threaten-
ing to the existing order in the country. These strange plants register the
risks and possibilities of open-source collaboration, which could be co-
opted or could upset existing power structures; either way, the technology
exists not on its own but in collaboration with other forms of power, both
tangible and intangible. Given the tie to the history and present of biopro-
specting in Africa, *The Hangman's Replacement* also reinforces the fraught
nature of collaborations around plant knowledge; research into and com-
pensation for healing plant knowledge, like other forms of collaboration,
often resists identifiable creators or reliable outcomes.

From Brain Drain to Possibility: *Nigerians in Space*

Just as the flame lilies in *The Hangman's Replacement* have mysterious
effects and sources, Dayo's moonlight lamp in *Nigerians in Space*, with
which this article begins, is more than just an example of clever technology
pieced together from available parts to address power outages. It is all those

65. Ibid., "The Determination Gene."
66. Ibid., "This Is Overwhelming."

things, and the detail with which Olukotun describes the lamp's construction in his novel demonstrates a concern with these modes of creation, but the lamp also serves as a figure for understanding collaboration as it relates to technology, especially in the way that collaborations can result in more than what was originally intended.

Nigerians in Space, a continent-spanning thriller with elements of speculative fiction, begins in 1993, when Dayo's father Wale, a successful geologist living in the United States, steals a lunar sample from the lab where he works. His theft is a bid to demonstrate loyalty to a Nigerian politician named Nurudeen Bello, who is bringing Nigeria's best scientific minds back to the country from across the diaspora for a space and technology program called Brain Gain. Accordingly, and the novel spans North America, Europe, as well as West, Southern, and Eastern Africa. For Wale, Bello's Brain Gain offers career advancement unattainable in America, so he steals the requested lunar sample and hides it in a cat snow globe, which he gives as a present to Dayo, then a small child.[67] It is this snow globe that forms the prototype for Dayo's moonlight lamps. Brain Gain does not pan out, and Dayo and Wale move to Cape Town, where they have been living in exile for the past twenty years. They face discrimination as Nigerians; plus, Wale fears for his life because someone has been killing off the former Brain Gain recruits. Dayo now constructs moonlight lamps and begins a partnership with Thursday, a young man who has fallen into the illegal abalone trade. Though there are more questions about Brain Gain and its aftermath than answers, Dayo still looks with some hope towards the future.[68] The Brain Gain of *Nigerians in Space* is an obvious reversal of "brain drain." The failures of this program to materialize is not unlike the sense of loss depicted in *Zoo City* and among Ferguson's Copperbelt miners. But collaboration still functions strategically in *Nigerians in Space* to offer possibility and production in difficult and unequal situations.

Scientific research can be impossible without sufficient funding or material resources. Because of this lack, several of the Ghanaian researchers whom Osseo-Asare discusses in *Bitter Roots* had to leave Ghana, particularly during the economically difficult late twentieth century, to complete their research abroad or to gain funding through foreign partnerships.[69] Indeed, the phenomenon of brain drain has a significant impact on scientific and technological research across African countries, including the Ni-

67. Olukotun's narrator explains, "Wale had rocketed to the top of the academic world as a lunar geologist, only to slam into a glass ceiling while Americans soared through to upper level positions and he rotted away in a lab." The language of flight ("rocketed," "soared") here emphasizes how unlikely it is that Wale will ever become a "Nigerian in space" if he stays in the United States due to exclusionary practices. Olukotun, *Nigerians in Space*, 13.
68. It should be noted that Olukotun has written a sequel to *Nigerians in Space* entitled *After the Flare*, which was published in September 2017.
69. Osseo-Asare, *Bitter Roots*, 163.

geria of *Nigerians in Space*. However, contemporary thinking about brain drain acknowledges the benefits of remittances sent home and other ways that the departure of scholars and researchers can, in fact, facilitate economic gain for source nations.[70] Nonetheless, the failures of the Brain Gain project in Nigerians in Space speaks to corruption in Nigeria, to which the failure is attributed, as well as to the vast numbers of Nigerians living abroad. Author Olukotun himself was born in the United States, has a Nigerian father, and has spent time as an adult in South Africa and Nigeria; he enacts diasporic trajectories similar to those he depicts in his novel.

In the face of a precarious situation in Cape Town, Dayo's moonlight lamp stands out as a symbol of collaboration and possibility. Until Dayo crafts it into a lamp, the snow globe's moon dust rests inert. The lamp, likewise, cannot function without the moon dust. *Nigerians in Space* enters the realm of the imaginative here—though Dayo's subsequent lamps do not have actual moon dust in them, they are uncannily able to replicate genuine moonlight. When he first sees the lamp function during a power outage, the abalone trader Thursday thinks, "The real thing of the crescent . . . a star below it, the real thing rocking across the sky, the tidal thing, the new thing, the full thing, the werewolf thing: 'The moon.'"[71] Thursday's mind is transported to space in this moment. The lamp simultaneously evokes *several* of the moon's phases (crescent, new, full) and is tied to mysterious powers and possibilities: tides and werewolves. Furthermore, Thursday's abalone respond very positively to this magical light—a wholly unintended consequence and effect of the lamp's creation.

A true collaboration between Dayo and Thursday begins: Thursday requires Dayo's lamp to invigorate his delicate abalone, and Dayo makes use of funds from Thursday's abalone trade to realize his dream of producing enough lamps to light the neighborhood. Yet noir elements abound in this novel, and there is danger and conflict around many, if not most, corners. The gang for whom Thursday maintains the abalone is violent and dangerous, and at one point he also is picked up by abusive police officers. The joint moonlight lamp effort is not without its dangers, even for two young men of benevolent mindset.

The description of Dayo's moonlamps-turned-streetlamps provides another example of the significance of collaboration to this text. Dayo invites everyone in the neighborhood, through a series of tricks to entice those of diverse interests and backgrounds, to his intended light show. The lights are not working, and Dayo ends up struggling with a homeless drunk man, who refuses to cede one of the lamps. Yet even this contested moment where Dayo fights with the man has unintended consequences; while the man holds the lamp, it begins to shine:

70. Assefaw Bariagaber, *International Migration and Development in Eastern and Southern Africa*, 124; John Gibson and David McKenzie, "Eight Questions," 121.
71. Olukotun, *Nigerians in Space*, 189.

> The bergie had done it! Free of the lamp post, which had grounded the charge, the light was working. Dayo began running from lamp post to lamp post, snipping wires, pleading with people to hold up the lamps in their hands. He offered out sums of money he did not have. He promised chocolates and pints of cane spirit. Within a short while, he had assembled an army of drunks, passersby, and hippies bonded by a chain of shimmering blue light.
>
> The forty lamps sent the moonlight shooting into the disco ball, scattering it throughout Obz.[72]

Intended as an answer to the darkness (and related crime) that comes from the scheduled power outages, in this moment Dayo's lamps read almost like part of impromptu group performance art. Dayo, with the help of his unwitting and coerced audience members, reproduces the perfect and bright light of a full moon. The use of the disco ball, though a necessary part of projecting the light, also increases the whimsical and artistic possibility of this moment. The light "shimmers," "shoots," and "scatters." This is collaboration in many ways, not all of it planned or intended. But author Olukotun undercuts the apparently sentimental depiction of community cooperation with danger and uncertainty. Readers know that just as Dayo's lamps are lighting the community, his father Wale is being interrogated and eventually shot, his Brain Gain work apparently catching up with him.

Dayo's lamp, its production, meaning, and unintended effects, is just one aspect of *Nigerians in Space*, alongside the fictional "Brain Gain" project for which Wale was recruited. Brain Gain signals technological collaboration across Africa and the diaspora but never extends beyond its earliest stages. Set against the backdrop of this failed collaborative program, then, Dayo's lamp serves as a cautious proclamation of possibility. Collaboration, here, might court danger and risk but is ultimately necessary, productive, even beautiful, and, importantly, not bounded by what is typically possible in everyday life.

Conclusion: Technologies of the Unseen

The human-animal relationships in *Zoo City*, the carnivorous flame lilies in *The Hangman's Replacement*, and the moonlight lamp in *Nigerians in Space* all require innovations that extend beyond the realm of the technically possible. As discussed, these representations of collaboration have ties to southeastern Africa's industrial past, bioprospecting across Africa, and the opportunities of "brain drain" research abroad, respectively. Collaboration's associations with loss, risk, and possibility in these contexts indicate that technology traffics in the uncertain, unseen, and unpredictable just as much as it does the quantifiable and measurable. Collaborative

72. Ibid., 267.

works frequently resist control, as Osseo-Asare's research on plant knowledge and *The Hangman's Replacement* demonstrate. The lived experiences of technologies are often inseparable from the spiritual, as Mavhunga's research on innovation in Zimbabwe and all three novels examined convey. And while we know, given Callon's work and those he's influenced, that non-human actors can be significant contributors to technology, *Zoo City* goes a step further to insist that non-human actors can, in fact, become very like humans in collaborative spaces. This is precisely why the concept of "collaboration" as it is used to discuss open-source culture and web-based works is appropriate. That version of "collaboration" favors projects that have unpredictable influences and that might result in multiple repercussions. This can lead to confusion and uncertainty and can pose a direct threat to existing structures of knowledge or surveillance but can also offer illumination. If African actors have helped power the world's industrialization (as in Hecht and Ferguson's research), then perhaps there is a need to continue to acknowledge the global collaborative technological practices in which those in Africa inevitably participate. Indeed, imaginative literature speaks to Africans' experiences of technology, further insisting on the ways African actors and spaces have been and continue to be integral to larger histories of technology.

In *The Hangman's Replacement*, *Zoo City*, and *Nigerians in Space*, "collaboration" occurs not just among people intentionally or unintentionally working together on a project but also in conjunction with unseen forces and broader contexts. The mix of effects, as well as shifts between subject and object positions (especially as seen in *Zoo City*), also recalls the multifaceted ways that collaboration has been understood in the history of research in and about Africa. Considering disciplinary debates in African studies about the relationship between literary and historical study, the concept of "collaboration" ultimately provides a method to analyze African literature in historical context, reminding us that literary narratives, as well as historical ones, emerge at the intersection of numerous actors and forces, whether seen or unseen. The three novels' representations of collaboration ultimately emphasize the relevance of the non-human and unseen in our understanding of technology and agency.

Bibliography

Primary Sources

Beukes, Lauren. *Zoo City*. Nottingham, UK: Angry Robot, 2011.
Chiveneko, Taona D. *The Hangman's Replacement: Sprout of Disruption*. Chiveneko Publishing, 2013. Adobe Digital edition.
Olukotun, Deji Bryce. *Nigerians in Space*. Los Angeles: Unnamed Press, 2014.

Secondary Sources

Armstrong, Nancy. "The Affective Turn in Contemporary Fiction." *Contemporary Literature* 55, no. 3 (2014): 441–65. doi: 10.1353/cli.2014.0023.

Austen, Ralph A. "Colonialism from the Middle: African Clerks as Historical Actors and Discursive Subjects." *History in Africa* 38 (2011): 21–33. http://www.jstor.org/stable/41474542.

Bariagaber, Assefaw. *International Migration and Development in Eastern and Southern Africa.* Addis Ababa: OSSREA, 2014. EBSCOhost e-book.

Callon, Michel. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St. Brieuc Bay." http://www.vub.ac.be/SOCO/tesa/RENCOM/Callon%20(1986)%20Some%20elements%20of%20a%20sociology%20of%20translation.pdf.

The Contributors. *Collaborative Futures.* 2010. http://collaborative-futures.org/material/collaborativefutures-en-2010.09.06-5.5x8.5.pdf.

Collins, Martin. "Editor's Note." *History & Technology* 29, no. 3 (September 2013): 227–28. http://dx.doi.org/10.1080/07341512.2013.875757.

Ferguson, James. *Expectations of Modernity: Myths and Meanings of Urban Life on the Zambian Copperbelt.* Berkeley: University of California Press, 1999. EBSCOhost e-book.

Gibson, John and David McKenzie. "Eight Questions about Brain Drain." *The Journal of Economic Perspectives* 25, no. 3 (Summer 2011): 107–28. http://www.jstor.org/stable/23049425.

Hecht, Gabrielle. *Being Nuclear: Africans and the Global Uranium Trade.* Cambridge: MIT Press, 2012.

Hornberger, Julia. "Nocturnal Johannesburg." *Johannesburg: The Elusive Metropolis.* Ed. Sarah Nuttall and Achille Mbembe. Durham: Duke University Press, 2008. 285–96. Google Books edition.

Huffman, Thomas N. "Debating Great Zimbabwe." *The South African Archaeological Bulletin* 66, no. 193 (June 2011): 27–40. http://www.jstor.org/stable/41408530.

Hyslop, Jonathan. "Gandhi, Mandela, and the African Modern." *Johannesburg: The Elusive Metropolis.* Ed. Sarah Nuttall and Achille Mbembe. Durham: Duke University Press, 2008. 119–36. Google Books edition.

Jasanoff, Sheila. "Beyond Epistemology: Relativism and Engagement in the Politics of Science." *Social Studies of Science* 26, no. 2 (May 1996): 393–418. http://www.jstor.org/stable/285424.

Jeyifo, Biodun, and Eileen Julien. Introduction. *The Locations and Dislocations of African Literature: A Dialogue Between Humanities and Social Science Scholars.* Ed. Eileen Julien and Biodun Jeyifo. Trenton: Africa World Press, 2016. vii–xxix.

Klein, Martin. "African Participation in Colonial Rule: The Role of Clerks,

Interpreters, and Other Intermediaries." *Intermediaries, Interpreters, and Clerks: African Employees in the Making of Colonial Africa*. Ed. Benjamin N. Lawrance, Emily Lynn Osborn, and Richard L. Roberts. Madison: University of Wisconsin Press, 2006. 273–85. Adobe Digital edition.

Lawrance Benjamin N., Emily Lynn Osborn, and Richard L. Roberts. "Introduction: African Intermediaries and the 'Bargain' of Collabora- tion." *Intermediaries, Interpreters, and Clerks: African Employees in the Making of Colonial Africa*. Ed. Benjamin N. Lawrance, Emily Lynn Os- born, and Richard L. Roberts. Madison: University of Wisconsin Press, 2006. 3–34. Adobe Digital edition.

Martino, Enrique. "Open Sourcing the Colonial Archive—A Digital Mon- tage of the History of Fernando Pó and the Bight of Biafra." *History in Africa* 41 (2014): 387–415. doi: 10.1353/hia.2014.0008.

Marwick, Alice E. "Open Markets, Open Projects: Wikipedia and the Politics of Openness." *Public Books* July 1, 2015. http://www.public- books.org/nonfiction/open-markets-open-projects-wikipedia-and- the-politics-of-openness.

Mavhunga, Clapperton Chakanetsa. *Transient Workspaces: Technologies of Everyday Innovation in Zimbabwe*. Cambridge: MIT Press, 2014. Kin- dle edition.

Mbembe, Achille and Sarah Nuttall. "Introduction: Afropolis." *Johannes- burg: The Elusive Metropolis*. Ed. Sarah Nuttall and Achille Mbembe. Durham: Duke University Press, 2008. 1–36. Google Books edition.

Osseo-Asare, Abena Dove. *Bitter Roots: The Search for Healing Plants in Africa*. Chicago: University of Chicago Press, 2014.

Parker, John. "The Dynamics of Fieldwork Among the Talensi: Meyer Fortes in Northern Ghana, 1934–7." *Africa: The Journal of the Interna- tional African Institute* 83, no. 4 (November 2013): 623–45. doi: 10.1017 /S000197201300048X.

Rich, Jeremy. "'White Coronations and Magical Boycotts': Omyènè Polit- ical Strategies, Clan Leaders, and French Rules in Coastal Gabon, 1870– 1920." *The International Journal of African Historical Studies* 43, no. 2 (2010): 207–26. http://www.jstor.org/stable/25741428.

Rofheart, Mahriana. *Shifting Perceptions of Migration in Senegalese Liter- ature, Film, and Social Media*. Lanham, MD: Lexington Books, 2014.

Roos, Henriette. "'The War of the Worlds': Relocating the Boundaries be- tween the Human and the Non-Human." *Journal of Literary Studies* 27, no. 4 (Dec 2011): 50–70. doi: 10.1080/02564718.2011.629445.

Schumaker, Lyn. *Africanizing Anthropology: Fieldwork, Networks, and the Making of Cultural Knowledge in Central Africa*. Durham: Duke Uni- versity Press, 2001. Kindle edition.

Terretta, Meredith. "Chiefs, Traitors, and Representatives: The Construc-

tion of a Political Repertoire in Independence-Era Cameroun." *The International Journal of African Historical Studies* 43, no. 2 (2010): 227–53. http://www.jstor.org/stable/25741429.

Tkacz, Nathaniel. *Wikipedia and the Politics of Openness.* Chicago: University of Chicago Press, 2015.

Williams, Rosalind H. "The Lantern-Bearers of the History of Technology." *History & Technology* 29, no. 3 (September 2013): 262–74. http://dx.doi.org/10.1080/07341512.2013.858521.

_____. *The Triumph of Human Empire: Verne, Morris, and Stevenson at the End of the World.* Chicago: University of Chicago Press, 2013. EBSCOhost e-book.

Wilson-Tagoe, Nana. "History, Gender, and the Problem of Representation in the Novels of Yvonne Vera." *The Locations and Dislocations of African Literature: A Dialogue Between Humanities and Social Science Scholars.* Ed. Eileen Julien and Biodun Jeyifo. Trenton: Africa World Press, 2016. 137–74.