NO BODY, NO CRIME? VICARIOUSLY IMAGINING AFRICA'S ARSENIC CENTURY: BOVINES, ARSENIC POISONING AND MULTI-SPECIES TOXIC HISTORIES IN SOUTHERN RHODESIA (COLONIAL ZIMBABWE), 1900–1940s

Elijah Doro

University of Agder

Email: elijah.doro@uia.no

ABSTRACT

During the first half of the twentieth century, white settler farmers in colonial Zimbabwe raised incessant complaints and alarm over 'mysterious' and inexplicably frequent incidences of cattle mortalities. These mortalities were attributed to poisoning from careless handling of arsenical dips, ingestion of arsenic sprayed grass and grazing in veld impregnated with arsenic trioxide. The arsenic question occupied the attention of experts from the colonial Branch of Chemistry, toxicologists, bacteriologists, veterinary officials and white settler farmers in contested cattle-centred narratives. Within the framing of colonial toxic politics, cattle poisoning disproportionately received more elaborate scrutiny and attention than that of humans and other species. The colonial archive only affords limited and vague visibility to the toxic encounters of humans and non-bovine species. This paper seeks to transcend and interrogate bovine-centric poisoning discourses with which colonial sources are replete and to use existing cattle poisoning records to amplify and construct multi-species toxic histories connecting cattle, humans, landscapes and other species in a co-constituted narrative of arsenic toxicities. The paper employs vicarious reimagination of experiences to reframe Africa's 'arsenic century' and colonial toxic histories outside the body-centric script, and examines the intricate and complex chemical relations enmeshing cattle, humans and other species in ecosystems of mutual toxic vulnerabilities and slow chemical violence. The paper uses archival sources, toxicological reports from the Branch of Chemistry and veterinary records of cattle poisoning in colonial Zimbabwe.

Keywords: Arsenic, poisoning, toxic histories, colonial Africa, multi-species, Zimbabwe

The forlorn quest for bodies in toxic colonial landscapes: Vicarious imagination, disposable functionality and co-constituted toxic histories

While engaged in archival research on toxic histories of colonial Zimbabwe, I was entangled in a methodological and conceptual predicament. The archival material (toxicological records, chemical analysis data, scientific reports etc.) almost exclusively contained documents on poisoning of cattle. Humans and other species were rare to encounter in the colonial archival memory. I was much interested in human experiences to make a compelling story vindicated and legitimised by the display of human bodies. I felt that culpability and accountability for colonial chemical violence would diminish if there were no human bodies to display as tangible evidence. After all, bodies are the tactile exhibits at the crime scene and, without substantial human bodies as evidence, my research seemed a dead end. No body, no crime!

Academic literature from classical philosophy to modern scientific theory has all emphasised that humans and animals share one common attribute – the body.[1] The body is the universal surface through which both humans and animals process existence and express beingness. Thus, bodies are the frames of corporeality and reality. The barrier between the human and animal body is so liminal that the diseased human body has been historically routed through the animal body and vice versa.[2] Animal bodies have been implicated in human health and acted as surrogate bodies towards the medical understanding of the human body.[3] Humans and animals are also connected to historical and socio-political contexts, such that seeing bodies is a historical process that involves complex narratives of representations, nomenclature and ascription of value.[4] Subsequently, human and animal bodies are not neutral entities but are embedded within socio-political constructions and power hierarchies. Within these power hierarchies, some bodies are disposable and dispensable, others indispensable and imperative. Across history, animals and subject humans have been

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[1] See S. Donaldson and W. Kymlicka, *Zoopolis*: *A Political Theory of Animal Rights* (New York: Oxford University Press, 2011); J.B. Landes, P.Y. Lee and P. Youngqist, *Gorgeous Beasts: Animal Bodies in Historical Perspective* (PA: The Pennsylvania State University Press, 2012).

[2] H. Brown and A. Nading, 'Human animal health in medical anthropology', *Medical Anthropology Quarterly* **33** (1) (2019): 5–33.

[3] A. Cassidy et al., 'Animal roles and traces in history of medicine', c. 1880–1980', *BJHS: Themes* **2** (2017): 11–33.

[4] J.B. Landes, P.Y. Lee and P. Youngqist, 'Introduction', in Landes, Lee and Youngqist (eds.), *Gorgeous Beasts*, pp. 1–20.

conscripted for exploitation as disposable and expendable bodies.[5] Animals such as cattle and 'native' humans were important objects for white settler economic prosperity and colonial expansion in Africa. Settler colonialism in Africa was accessorised through the relentless and systematic exploitation of both indigenous people and animals.[6] White settler capitalism deployed the denigrated status of the animal to morally justify subjugation of non-white humans.[7] Thus the animalisation of blacks and indigenous people in white settler colonial discourses legitimated their dehumanisation and denial of citizenship status. Domestic animals and indigenous humans were subjects, while settlers were citizens.[8] Indigenous humans became enmeshed with animal identities and animality.[9] They had mutual physical vulnerabilities and experiences of historical persecution and marginalisation and were only valued for their disposability.[10]

The 'animal turn' in the humanities and social sciences escalated focus on animal bodies, animal agency and animals as legitimate subjects of colonial histories.[11] A wave of critical decolonial animal studies literature steeped in race theory emphasised that discourses on animality must revisit how settler colonialism thrived through the simultaneous erasure and exploitation of animals and indigenous humans.[12] The domestication of animal bodies as

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[5] D.N. Pellow, *What is Critical Environmental Justice*? (Cambridge: Polity, 2017).

[6] J. Gewald, M. Spierenburg and H. Wels, 'Introduction: People, animals, morality, and marginalisation: Reconfiguring wildlife conservation in southern Africa', in J. Gewald, M. Spierenburg and H. Wels (eds), *Nature Conservation in Southern Africa: Morality and Marginality: Towards Sentient Conservation* (Leiden, Boston: Brill, 2019), pp. 1–24.

[7] K.S. Montford and C. Taylor, 'Colonialism and animality: An introduction', in K.S. Montford and C Taylor (eds), *Colonialism and Animality: Anti-colonial Perspectives in Animal Studies* (New York: Routledge, 2020), pp. 1–16.

[8] For citizenship and subjects in the colonial state in Africa, see M. Mamdani, *Citizen and Subject: Contemporary Africa and the Legacy of Late Colonialism* (New Jersey: Princeton University Press, 1996).

[9] M. Deckha, 'Unsettling anthropocentric legal systems: Animal personhood, indigenous laws, and reconciliation', *Journal of Intercultural Studies* **41** (1) (2020): 77–97.

[10] G. Bradshaw, *Carnivore Minds: Who these Fearsome Animals Really Are* (London: New Haven, 2017).

[11] See, V.D. Anderson, *Creatures of Empire: How Domestic Animals Transformed Early America* (Oxford: Oxford University Press, 2004); A. Mikhail, *The Animal in Ottoman Europe* (Oxford: Oxford University Press, 2014); E. Fudge, 'What was it like to be a cow? History and animal studies', in L. Kalof (ed.), *The Oxford Handbook of Animal Studies* (New York: Oxford University Press, 2017); S. Swart, *Riding High: Horses, Humans and History in South Africa* (Johannesburg: Wits University Press, 2010); J. Saha, *Colonizing Animals: Interspecies Empire in Myanmar* (Cambridge: Cambridge University Press, 2022).

[12] See B. Belcourt, 'Animal bodies, colonial subjects: (Re)locating animality in decolonial thought', *Societies* (5) (2015): 1–11; J. Sze, 'Race, animality and animal studies', *American Quarterly* **72** (2) (2020): 497–505; C.J. Kim, *Dangerous Crossings: Race, Species, and Nature in a Multicultural Age* (Cambridge: Cambridge University Press, 2015); C.J. Kim, 'Murder and mattering in Harambe's house', *Politics and Animals* (2) (2016): 37–51; B.Boisseron, *Afro-dog: Blackness and African Question* (New York: Columbia University Press, 2018); B.

capitalist subjects reified hegemonic forms of white settler power through racist politics of territoriality that subjected indigenous lands as settler spaces and domestic animals as subjects therein.[13] Therefore, racist histories of animalisation of non-white communities must be reappraised to illuminate on the inter-constitution of blackness and *animalness*. Subsequently, the arrogation of agency and subjectivity to animal bodies within critical animal studies must neither obscure nor obtund our sensitivities to the concurrent settler colonial racist objectification and animalisation of indigeneity. The conferment of agency and rights to animals must not obfuscate or displace people of colour who subsist on structural violence and are consigned as disposable bodies.[14] Both animals and colonised humans were assigned death in settler colonial constructs – animals as consumer commodities embedded in the necropolitical global economy and colonised people as disposable cheap labour for capitalist extractive viability. As Billy-Ray Belcourt puts it, 'animals must live to die', while 'indigenous people must die for the settler to live'.[15]

This paper joins the decolonial approaches towards understanding animality, race and expendability in settler colonial landscapes and extends these by framing the discussion within hitherto unexplored histories of chemical violence in Africa. While historical literature abounds on the explicit and visible forms of violence in colonial Africa, the subtle but insidious chemical violence writ on both human and animal bodies remains an understudied and neglected area. This negligence inadvertently invisibilises the continent's globalisation into 'toxic empires'[16] during settler colonial rule, when poisons such as arsenic were instrumentalised to tame the 'wildernesses' and make conditions amenable for white settlement and prosperity.[17] These toxic experiences inscribed durable and corrosive damage on landscapes and bodies, leaving behind 'imperial debris'.[18]

Belcourt, 'An indigenous critique of critical animal studies', in Montford and Taylor (eds), *Colonialism and Animality*, pp. 19–28; Saha, *Colonizing Animals*.

[13] Belcourt, 'Animal bodies', 1–11.

[14] Belcourt, 'An indigenous critique', pp. 19–28.

[15] Ibid.

[16] See D. Arnold, *Toxic Histories: Poison and Pollution in Morden India* (Cambridge: Cambridge University Press, 2016), p. 144.

[17] C. Mavhunga, 'Vermin beings: On pestiferous animals and human game', *Social Text* **29** (1) (2011): 151–76.

[18] For a discussion on the concept of 'imperial debris', see A.L. Stoler, *Duress: Imperial Durabilities in Our Times* (Durham, NC: Duke University Press, 2016); A.L. Stoler, 'The rot remains: From ruins to ruination', in A.L. Stoler (ed.), *Imperial Debris: On Ruins and Ruination* (Durham, NC: Duke University Press, 2013), pp. 1–29. For afterlives of imperial toxic debris in contemporary and post-colonial Africa, see, D. Carrington 'The world's most toxic town: The terrible legacy of Zambian lead mines', *The Guardian Weekly*, 28 May 2017:

The paper employs two conceptual tools of analysis: *vicarious imagination* and *functional disposability* to investigate cattle and human experiences of arsenic poisoning and chemical violence in colonial Zimbabwe. As colonial subjects, both cattle and Africans were subjected to disproportionate chemical exposure. Both were fated to die within the colonial infrastructure of capitalist violence. Cattle were doomed to die for settler capitalist industrial processes like export beef production.[19] The utility of cattle for settler colonialism was hinged on their fertility, labour, flesh and how they could generate financial value.[20] Therefore, cattle deaths outside the standardised industrial process where their bodies could not generate financial value constituted great loss to settler economic power. Thus, cattle deaths from arsenic exposure caused greater worry.[21] Meanwhile, Africans were disposable labour to protect white settler society from disease, vermin, parasites and economic collapse. Their chemical death was not a liability but a necessity for settler power and their bodies were expendable assets for the survival of settler power. Thus, while both cattle and Africans were disposable bodies within the colonial mega-system, their disposability was defined by the intersection of death, space and purpose/cause. The disposability of a subject body had to be functional to settler colonial interests and death had to occur within a prescribed space and for a prescribed purpose. Death outside the spatial confines where the body had economic value and purpose constituted a great loss. I refer to this relationship between death and purpose as '*functional disposability*'. Functional disposability is the disposable value of a body where death is a constant and cause of death (relatable to purpose of death) the variable. Thus, $ƒ(d) = \theta(P) \div \kappa(D)$. The lower the functional disposability of a body within a given spatial entity, the higher the level of concern over its loss and the greater its visibility in official memory and accounts. If, $ƒ(d)\ B\ <\ ƒ(d)A$ then B is made more visible than A.

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https://www.theguardian.com/environment/2017/may/28/the-worlds-most-toxic-town-the-terrible-legacy-of-zambias-lead-mines (accessed 25 June 2022). Also see I. Pesa, 'Mining waste and environmental thought on the Central African copperbelt, 1950–2000', *Environment and History* **28** (2) (2022): 259–84; S.Chetty, L. Pillay and M.S. Humphries, 'Gold mining toxic legacy: Pollutant transport and accumulation in the Klip river catchment, Johannesburg, South Africa', *South African Journal of Science* **117** (7/8) (2021): 87–97; M.R. Ramudzuli and A.C. Horn, 'Arsenic residues in soils at cattle diptanks in the Vhembe district, Limpompo province, South Africa', *South African Journal of Science* **10** (7–8) (2014): 64–70.

[19] M. Glover, 'A cattle centred history of southern Africa', in Gewald, Spierenburg and Wels (eds), *Nature Conservation in Southern Africa*, pp. 25–47.

[20] See E. Fudge, *Quick Cattle and Dying Wishes: People and their Animals in Early Morden England* (New York: Cornell University Press), p. 155.

[21] In colonial India, the settler state was more alarmed by arsenic poisoning of cattle than human poisoning. See Arnold, *Toxic Histories*, pp. 151–56.

To explore much intricately the toxic encounters and slow chemical death of humans, the paper uses a methodological framework of analysis called '*vicarious imagination*'. This involves the deployment of the much more visible cattle bodies and experiences in the archival material to reconstruct the invisibilised encounters of marginalised Africans and other species. This methodological template flips the orthodox animal studies approach of sympathetic and empathetic imaginaries.[22] If we can reconstruct sentient animal experiences through imaginative human empathy, corporeally and viscerally, then we can also reconstruct and interpret the experiences of invisibilised humans by imagining them through cognate animal bodies. As Vinciane Despret puts it, historical agency need not be confined to what is visible but should also be constructed from how things are made visible.[23] Our methodological outlooks should also endeavour to make visible the peripheralised humans within animal-centric settler colonial sources. This is not a methodological critique of the animal turn, but a conceptual reflection that we need to carefully approach the animal turn without foundering on the rocks of corrective non-human- animal centred colonial histories that marginalise the humans who suffered with the animals. Animal bodies can also be texts for historians to interpret not only animal experiences but expunged mutual human experiences.[24] These experiences are sometimes neither readily represented nor traceable in the indifferent colonial archive that glosses over marginalised and disposable humans. These experiences can be conjured by gleaning the archive for experiences of animals and embodying them to imaginatively reenact human experiences within similar spheres. This includes vicariously reincarnating and reenacting the animal encounters through simulative surrogate human bodies and an imaginative historical thought process. Chemical violence is latent and subtle.[25] Its investigation might require historical methods that appropriate extra-tangible sensory techniques.[26] Also, embodying imagination is an expedient method of

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[22] See Glover, 'A cattle centred history', pp. 25–47; M. Nussbaum, *Frontiers of Justice: Disability, Nationality, Species Membership* (Cambridge: Harvard University Press, 2006); J.M. Coetzee, *The Lives of Animals* (New Jersey: Princeton University Press, 1997).

[23] V. Despret, 'Responding bodies and partial affinities in animal-human worlds', *Theory, Culture, Society* **30** (7/8) (2013): 51–76.

[24] See S. Swart, 'The world the horses made: A South African case study of writing animals into social history', *International Review of Social History* **55** (2) (2010): 241–63.

[25] Rob Nixon examines how marginalised groups suffer environmental violence but are invisible and remain on the margins of official memory. See, R. Nixon, *Slow Violence and the Environmentalism of the Poor* (MA: Cambridge University Press, 2011).

[26] See, N.R. Hunt, 'An acoustic register: Rape and repetition in Congo', in Stoler (ed.), *Imperial Debris*, pp. 39–66; A. Azoulay, 'When a demolished house become a public square', in Stoler (ed.), *Imperial Debris*, pp. 194–226.

scientific enquiry and Dipesh Chakrabarty exhorts historians to write stories that also produce meaning through our capacities to reenact in our minds the experiences of the past.[27] Thus, anecdotal fragments in archival sources can be complemented with sensory methods to produce urgent histories of colonial chemical violence.

The paper uses vicarious imagination to interrogate the imprint of arsenic toxicities on humans, cattle, ecosystems and landscapes in colonial Zimbabwe from the beginning of the twentieth century. Arsenic was a key component of the coercive and bio-political entomological infrastructure in colonial Zimbabwe. Arsenic compounds were used as cattle dips and for the eradication of locusts. Furthermore, arsenic was generated as toxic waste from colonial mining landscapes. However, colonial toxic politics constructed narratives that privileged settler economic interests while erasing and trivialising the chemical contamination of disposable bodies within those landscapes. The paper redeems the disposable bodies and reconstructs a nuanced co-constituted and multi-species narrative blending cattle and humans to illuminate the preponderance and perversity of colonial chemical violence. It unpacks how chemical relations within locust destruction landscapes, mining landscapes and pastoral landscapes traversed the visible boundaries between human and cattle bodies within an intricate and complex relational infrastructure.[28]

The paper 'looks deeper' into arsenic ruptured cattle bodies and imaginatively situates the poison within multi-species relations.[29] These relations are not readily depicted within the colonial archival sources that are indifferent to the innate functionality and attachment of bodies. From the beginning of the 1920s, the field of toxicology employed animal bodies as test subjects for estimating the threshold toxic limits for harm.[30] These body-centric models of harm codified in colonial toxicological thought espoused visible and quantifiable bodily harm as the only admissible evidence of chemical poisoning. Thus, bodies that could not be immediately and urgently quantified remained invisible from the official body counting gaze.

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[27] D. Chakrabarty, 'The climate of history: Four theses', *Critical Enquiry* **35** (2) (2009): 197–222. Also, see M. Warner, *Phantasmagoria: Spirit Visions, Metaphors and the Media into the Twenty-first Century* (Oxford: Oxford University Press, 2006), p. 47.

[28] L. Nash, *Inescapable Ecologies; A History of Environment, Disease and Knowledge* (Berkeley: University of California Press, 2006), p. 8.

[29] See, Timothy LeCain, *The Matter of History: How Things Create the Past* (New York: Cambridge University Press, 2017), p. 142. For a discussion on multispecies histories, see E. O'Gorman and A. Gaynor, 'More-than-human histories', *Environmental History* **25** (2020): 711–35.

[30] See W.R. Bradley, M.S. William and W.G. Frederick, 'The toxicity of antimony - *animal studies'*, *American Industrial Hygiene Association Quarterly* **2** (2) (1941): 15–22; Nash, *Inescapable Ecologies*, p. 142.

New decolonial approaches have contested these body-centric world views for ignoring complex natural and biological relationships and the inseparability of bodies.[31] Consequently, methodologies that reframe colonial toxic encounters beyond archival and body-centric postulations are critical. As Max Liboiron succinctly reflects, if our methodological interventions do not address relations, then 'they don't address colonialism'.[32] Africa's arsenic century requires a decolonial redress and an anti-colonial attention to the invisibilised chemical violence of colonial encounters and show how temporalities of these toxicities impinged in the bio-political production of citizenship and peoples' lives in the white settler colonial state.[33]

Deciphering embedded bodies in colonial toxicities: The locust destruction campaigns and arsenic poisoning in Southern Rhodesia, 1900–1940

From the end of the nineteenth century most African colonies were struck with a wave of locust invasions that inflicted widespread mayhem and plunder.[34] These swarms crept into southern African colonial territories of Transvaal, Natal, Bechuanaland, Northern Rhodesia and Southern Rhodesia, plundering colonial export agriculture and causing periodic famines between 1894 and the 1940s.[35] Colonial entomologists in southern Africa initially adopted traditional and labour-intensive methods of control such as scourging and trapping.[36] However, in 1897, a breakthrough in locust control using arsenic poison was made in Natal and it proved more effective and cheaper.[37]Arsenic revolutionised pest control technology in

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[31] See, M. Liboiron, *Pollution is Colonialism* (Durham, NC: Duke University Press, 2021); M. Murphy, 'Alterlife and decolonial chemical relations', *Cultural Anthropology* **32** (4) (2017): 494–503.

[32] Liboiron, *Pollution*, p. 78.

[33] See W. Viney, *Waste: A Philosophy of Things* (London, New York: Bloomsbury Publishing, 2014); A. Eastley, 'Exploiting El Dorado: Subalternity and the environment', *Journal of Commonwealth and Postcolonial Studies* **13** (2) (2008): 38–58.

[34] C. Peloquin, 'Locust swarms and the spatial techno-politics of the French resistance in World War II', *Geoforum* **49** (2013): 103–13.

[35] See C. Ballard, '"A year of scarcity": The 1986 locust plague in Natal and Zululand', *South African Historical Journal* **15** (1) (1983): 34–52; S.N. Chipungu, 'Locusts, peasants, settlers and the state in Northern Rhodesia', *Trans African Journal of History* **15** (1986): 54–80; P. Uledi and G. Hove, '"A war of man against locust"! Locust invasions and anti-locust campaigns in Salisbury, Southern Rhodesia, 1918–1940s', *South African Historical Journal* **70** (4) (2019): 689–707; K. Brown, 'Political entomology: The insectile challenge to agricultural development in the Cape Colony, 1895–1910', *Journal of Southern African Studies* **29** (2) (2003): 529–49.

[36] Ballard, '"A year of scarcity", 34–52.

[37] *Bulawayo Chronicle*, 12 May 1897.

southern Africa and consolidated applied entomology as a branch of colonial agricultural science.[38]

The colonial infrastructure for locust control in Southern Rhodesia was political in nature and comprised the state's centralised administrative apparatus. African labour was coercively recruited using the authoritarian instruments of colonial native administration – namely chiefs, headmen and native commissioners.[39] White settlers and the police were employed as locust officers and supervised gangs of African labourers who did the most dangerous tasks of preparing the poisons and operating spray pumps.[40] In 1918, the Locusts Destruction Ordinance codified the state's authority to mobilise and deploy resources towards locust destruction.[41] The state distributed arsenic oxide, caustic soda (sodium hydroxide) and leaflets with chemical formulas for the preparation of recommended locust poison doses. The recommended poison was concocted by mixing one pound (1 lb) of arsenic oxide with one pound (1 lb) of caustic soda and boiling the mixture in four gallons of water to produce arsenite of soda (sodium arsenite).[42] The effervescing toxic solution was stirred using wooden paddles and extreme care had to be taken to avoid inhaling the deadly fumes.[43] Bucket pumps and later knapsack sprayers were used for spraying. Arsenite of soda was either dissolved in water and sprayed randomly over the grass in front of slowly moving hoppers or added to brown sugar as bait and placed on maize stalks, grass and sticks along all roads and in the fields.[44] This procedure was described as 'wasteful and dangerous'.[45] During the 1934 campaign, 212 tons of arsenic poison and 6,000 gallons (approx. 23,000 litres) of arsenic solutions were used in Southern Rhodesia.[46]

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[38] Brown, 'Political entomology', 529–49.

[39] *The Rhodesia Herald*, 24 May 1918.

[40] Locust destruction, 19 Oct. 1906, National Archives of Zimbabwe (hereinafter NAZ) G1/3/1/2.

[41] *The Rhodesia Herald*, 24 May 1918.

[42] *Bulawayo Chronicle*, 28 Oct. 1897; *The Rhodesia Herald*, 1 Aug. 1919.

[43] R.W. Jack, 'The locust position', *The Rhodesia Agricultural Journal* xxi (1924): 760–61.

[44] *Bulawayo Chronicle*, 28 Oct. 1897. Also see Assistant entomologist to Secretary for Agriculture Northern Rhodesia, 11 March 1915, NAZ G1/3/1/1.

[45] 'Locust poisons: Directions for use, 1934–35 campaign', *Rhodesia Agricultural Journal* **31** (12) (1934): 887–89.

[46] Report of the Southern Rhodesia Chief Entomologist, Dec. 1934.

Subsequently, cattle grazed the arsenic sprayed grass and poisoning ensued.[47] In 1908, a veterinary surgeon anxiously reported that, a 'great many' cases of arsenic poisoning of stock had occurred.[48] Cattle poisoning aroused concerns because such losses constituted a huge liability to the settler agricultural economy, export beef production for example.[49] Domestic animals in agrarian colonial spaces are the bodies through which animality was made more intelligible and material in settler imagination.[50] The imagination of animality in settler discourses of functional disposability privileged bovine-centric toxicological narratives in Southern Rhodesia and obscured colonised human subjects. Jonathan Saha critiques imperial animal discourses that mute the lives of the colonised human beings 'who lived and died alongside animals'.[51] Humans within these arsenic sprayed spheres were also vulnerable. Nevertheless, toxic thresholds in sprayed landscapes were exclusively calibrated using bovines. However, even then, authoritative scientific knowledge on arsenic tolerances for cattle was not yet established. The body of techno-scientific knowledge on toxicities in southern Africa was rather conjectural than concrete.[52] Prevalent scientific thinking until the 1930s held that freshly sprayed grass was safe for consumption by stock.[53] A series of trial-and-error experiments using cattle as test subjects during the mid-1930s eventually proved that such grazing was extremely dangerous to stock until the rains had fallen.[54]

Although veterinary records and toxicological reports acknowledged high stock mortality rates from arsenic poisoning, they insisted such cases were avoidable and arose from technical malpractices and gross negligence. The hackneyed scapegoat was that poisoning ensued when less dilute arsenite of soda was prepared and administered by the 'careless' African labourers.[55] This thinking was prevalent within colonial frameworks for health

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[47] 'Locust poisons', 887–89.

[48] L.E. Bevan, 'Poisoning of stock with arsenic', *The Veterinary Journal* **64** (11) (1908): 557–59.

[49] For colonial export beef, see I. Phimister, 'Meat and meat monopolies: Beef cattle in Southern Rhodesia, 1890–1938', *Journal of African History* **19** (3) (1978): 391–414.

[50] Belcourt, 'Animal bodies', 1–11.

[51] Saha, *Colonizing Animals*, p. 19.

[52] On colonial techno-science projects, see H. Tilley, *Africa as a Living Laboratory: Empire, Development and the Problem of Scientific Knowledge, 1870–1950* (Chicago: University of Chicago Press, 2011); C.H. Kelly, 'Cattle dip and shark liver oil in a techno-chemical colonial state: The poisoning at Malangali school, Tanganyika, 1934', *Journal of African History* **57** (3) (2016): 437–63.

[53] D.G. Steyn, 'Arsenical poisoning in stock', *Farming in South Africa*, March 1939.

[54] A.D. Husband and J.F. Duguid, 'The toxicity to grazing animals of grass sprayed with a solution of sodium arsenite', *Rhodesia Agricultural Journal* **31**(1) (1934): 25–39.

[55] 'Locust Destruction Act, 1936', *Rhodesia Agricultural Journal* **33** (5) (May 1936): 310–13.

developed from the early decades of the twentieth century that pathologised undisciplined non-white bodies as sources of polluted environments.[56] Oblivious and chemically exposed African labourers prepared the locust poisons and are often described in official scientific reports as 'notoriously careless'.[57] Both cattle and Africans were mired in the miseries of colonial power, but African bodies only inadvertently appear as phantom and transient silhouettes in the background of bovine narratives. A testimony by one colonial veterinary expert in 1908 reveals this:

> The work of spraying is left to farmers, policemen and often to natives who having little idea of the dangerous nature of the material handle it in a most careless manner. Their most common error has been to throw away haphazard the coarser pieces of arsenic which have not dissolved and have accumulated at the bottom of the bucket or a drum ... Cattle grazing over a large area are loathe to leave it … and it generally happens that some of the herd chance upon the larger undissolved particles which they greedily swallow and die...[58]

Three aspects require vicarious imaginative attention from the above testimony: dangerous material, little knowledge and carelessness. A deductive vicarious and imaginative reconstruction of the scenario reproduces images of extensive poisoning of African labourers preparing the poison although this is not remotely suggested in the archival text. Interestingly, the archival narrative takes a detour from the chemically compromised labourers and narrows the gaze of concern to cattle. Cattle become the visibilised victims, while the 'careless' and 'ignorant' African labourers preparing the dangerous material are obscured. The chemical exposure of the labourers is erased, and can only be imagined from bovine bodies. Imagination vividly recreates gangs of labourers nonchalantly mixing arsenic in buckets, inhaling the toxic fumes and arsenic-soiled hands tossing coarse chunks of the poison into the veld. These images replicated on several sites urgently evokes the unbridled scale of chemical violence on 'careless' Africans. Unlike cattle, Africans had disposable functionality within the colonial pest control infrastructure. Their deaths are routinised and casualised. They are not urgently framed because their bodies are disposable dermal surfaces to shield whites from disease and death. Arsenic has chronic carcinogenic and teratogenic

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[56] Nash, *Inescapable Ecologies,* p. 128.

[57] R.W. Jack, 'Notes on the biology and control of red locust in Southern Rhodesia, 1932–1933', *The Rhodesia Agricultural Journal*, **xxx** (1933): 791–804.

[58] Bevan, 'Poisoning of stock', 557–59.

effects. It causes lung cancer, skin cancer, kidney damage, cirrhosis and physical deformities in unborn babies.[59] It can be inhaled or absorbed through the skin. A South African entomologist acknowledged in 1923 that some African labourers operating spray pumps were gradually poisoned through inhaling some of the toxic dust and bled from their noses.[60] Sodium arsenite was also so highly dangerous that African factory workers had small particles 'gaining entrance' into their bodies and causing illnesses.[61] African juveniles ignorant of locust operations and poisons were sometimes recruited during these campaigns.[62]

The paraphernalia of centralised administrative apparatus for locust elimination was a conduit through which the settler colonial state exercised biopolitical power and a racialised bifurcated construction of chemical exposure to its subjects.[63] Africans were expendable and disposable bodies within the necro politics of the colonial pest control infrastructure.[64] There were poisoning accidents too. Some Africans were reported dead after 'mistakenly' drinking arsenic poison and locust rangers reported that Africans were 'ignorantly' poisoning children with locust poison.[65] Such incidences were common, but they obviously received little attention from colonial officials because they were treated as 'ordinary.' Most disasters are expunged from historical memory and policy planning by their framing as accidental and random.[66] Such disasters are made ordinary and forgettable because the burden of risk falls on the disposable bodies.[67]

Thus, when we gaze at bovine corpses in arsenic sprayed colonial landscapes, we must immerse and embed ourselves vicariously with the not so visible entities. We must conjure the bodies concealed from the glare afforded by archival sources. We should reincarnate experiences of the 'careless' and 'ignorant' human bodies conscripted as disposable for colonial chemical programs. Our vicarious gaze must fixate upon the oblivious and displaced

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[59] United States Department of health and Human Services, 'Toxicological profile for arsenic', August 2007: https://www.atsdr.cdc.gov/toxprofiles/tp2.pdf (accessed 10 Sept. 2022)

[60] C.W. Mally, 'Arsenite of soda as a locust poison', *Journal of the Department of Agriculture* (1923): 220–32.

[61] Official secretary Messrs. Chas. Page and Co., to Secretary Department of Lands and Agriculture, 26 Jan. 1934, NAZ, S1801/4673/4813.

[62] Uledi and Hove, 'A war of men', 689–707.

[63] On bio-power and necro politics, see M. Foucalt, *Il Faut Défendre la Société* (Bautes Etudes: Seuil,1976); A. Mbembe and L. Meitnjes, 'Necropolitics', *Public Culture* **15** (1) (2003): 11–40.

[64] Mavhunga, 'Vermin beings', 151–76.

[65] Uledi and Hove, 'A war of men', 689–707.

[66] Nixon, *Slow Violence*, p. 65.

[67] M. Davis, 'Los Angeles after the storm: The dialectics of ordinary disaster', *Antipode* **27** (1995): 221–24.

humans. We should inhabit the indifferent white settler locust officers handling out arsenic to ignorant and 'careless' African labourers. We must imagine caustic and carcinogenic solutions of arsenite of soda dripping down the sweaty backs of 'careless' labourers from leaky sprays. We should imagine the transgenerational carcinogenic and teratogenic effects and the slow invisible violence festering insidiously. We should embody and be entwined and entangled with every subject, object and sphere to visualise and re-enact the trail of chemical relations connecting dead cattle with multiple places and spheres – the forests, other grazing mammals, food sources, water, fish, birds and microbes. We should imagine the relations linking locust eating animals to poisoned food chains and contaminated soil and water.[68] Vicariously imagining the bovine encounters in the archival scripts pierces the fog of ambiguities to locate and illuminate other compromised species.

Cattle dipping and arsenical poisoning in Southern Rhodesia, 1902–1940

Arsenical dips came into vogue in southern Africa's colonial veterinary regimes during the end of the nineteenth century as diseases caused high stock mortalities. In 1902, there was an outbreak of East Coast Fever (ECF) in Southern Rhodesia and other parts of southern Africa. ECF was described as 'one of the most dangerous diseases' that had ever invaded the colonies.[69] By 1904, the disease had killed 20,000 white owned cattle in Southern Rhodesia.[70] The newly inaugurated colonial project was under threat as cattle were essential for colonial mining, farming and trading activities.[71] A breakthrough was made when the brown tick (*Rhipicephalus apprendiculattis*) was identified as the vector for ECF.[72] The immersion of stock in arsenic solutions became the widely recommended method of tick control. However, dipping cattle was not a new practice. It had been practised in America to combat Texas Fever during the 1890s.[73] Also, prior to the outbreak of ECF, livestock farmers in southern

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[68] See L.P. Cullen, *Beyond the Smoke that Thunders* (New York: Oxford University Press, 1940), p. 240; Chipungu, 'Locust, peasants', 54–80.

[69] Brown, 'Political entomology', 529–49.

[70] V.E.M. Machingaidze, The Development of Settler Capitalist Agriculture in Southern Rhodesia with Particular Reference to the Role of the State: 1908–1939. (Ph.D. Thesis, University of London, 1980), p. 312.

[71] W. Mwatwara, 'The tick was not slow to take advantage: Conflicts in the struggle against East Coast Fever in Southern Rhodesia, 1901–1920', *South African Historical Journal* **65** (2) (2013): 249–70.

[72] Brown, 'Political entomology', 529–49.

[73] D. Gilfoyle, 'The heartwater mystery: Veterinary and popular ideas about tick-borne animal diseases at the Cape, c.1877–1910', *Kronos* **29** (2003): 139–60.

Africa used arsenical dips. However, the use of arsenic dips intensified after 1902 as state veterinary authorities mobilised resources to eradicate ECF.[74] In 1904, dipping of cattle was made compulsory by statute in Southern Rhodesia.[75] The law obligated cattle to be dipped once every week and once a fortnight during higher and lower tick infestation seasons respectively. Dip tanks were constructed on white settler farms and in the remote African rural areas. By 1921, there were more than 2,000 dip tanks in Southern Rhodesia.[76] These now dilapidated dipping tanks still litter contemporary landscapes, not only as monuments of the hubris of colonial veterinary regimes but as sites of toxic legacies.[77] Scientific studies have shown that historical cattle dipping tanks poison underground water supplies and soils.[78] Regrettably, there have not been scientific investigations on the toxic legacies of these historic dipping sites in contemporary Zimbabwe.

Like locust poisons, the cattle dips used in Southern Rhodesia were home-made solutions prepared from sodium arsenite.[79] Three-day dipping solutions were prepared by diluting four pounds of arsenite of soda with 400 gallons of water and, for seven day solutions, eight pounds of arsenite of soda to 400 gallons water.[80] Arsenic was absorbed by cattle through the skin and ticks would be poisoned by imbibing arsenic impregnated blood.[81] Commercial dips came into the market around 1918/19 and regulations stipulated 64 per cent and 16 per cent as maximum arsenic concentration before and after dilution respectively.[82] However, much

[74] Brown, 'Political entomology', 529–49.

[75] W. Mwatwara, 'Even the calves must dip: East Coast Fever, Africans and the imposition of dipping tanks in Southern Rhodesia, 1902–1930', *South African Historical Journal* **66** (2) (2014): 320–48.

[76] D.A. Lawrence, 'The history of veterinary services in Rhodesia, 2, Period 1900–1921', *Rhodesian Veterinary Journal* **1** (3) (1970): 56.

[77] See Mwatwara, 'Even calves must dip', 320–48.

[78] J. Hauserman, 'A legacy of poisons', 2 June 1997: https://www.tampabay.com/archive/1997/06/02/a-legacy-of-poison/ (accessed 14 Oct. 2022); B.B. Edvantoro et al., 'Changes in microbial properties associated with long-term arsenic and DDT contaminated soils at disused cattle dip sites', *Ecotoxicology and Environmental Safety* **55** (2003): 344–51.

[79] *The Rhodesia Herald*, 5 Oct. 1906.

[80] 'Arsenite cattle dips: How to mix', *The Rhodesia Agricultural Journal* **xvi** (1919): 142.

[81] *The Rhodesia Herald*, 1 Sept. 1919.

[82] Chief chemist to Secretary Agriculture and Lands, 12 Oct. 1938, NAZ, S1786/12/3.

stronger dipping solutions were sometimes prepared, resulting in acute poisoning of cattle.[83] Other cattle mortalities arose from ingestion of arsenical dips. In 1914, the department of agriculture reported that the rate of cattle mortality from arsenic poisoning was alarming.[84] In 1913, 180 cattle on a ranching estate succumbed to arsenic poisoning.[85] At another farm 54 head of cattle all died at once after being dipped in a strong arsenic solution.[86] In 1934, the annual report of the branch of chemistry anxiously noted that 57 per cent of cattle viscera samples taken for toxicological analysis tested positive for arsenic.[87] By the 1940s, arsenic poisoning was one of the common causes of cattle death and in one district more cattle died from arsenical poisoning than all other causes put together.[88]

While the colonial gaze is engrossed with cattle mortalities, the African labourers who handled the arsenic dips are obscured and only foregrounded for the apportionment of blame, culpable and once again branded 'careless.' Carelessness distressed colonial officials and most reports reiterate a 'dangerous negligence' contributing to 'immense losses' of stock.[89] Within the functional disposability logic, the 'careless' African labourer was not a danger to himself, but his carelessness threatened the viability of the settler livestock economy. Africans had a disposable functionality. They had to die for the white settler cattle to live, while the white settler cattle had to live for them to die! Thus, predictably, the vulnerable African labourer diminishes in visibility and entrenched susceptibility. In one incident that reinforces the omnipresent susceptibility of 'careless' African labourers, a 'native servant' was reported to have administered a dipping fluid to cattle thinking it was water and 'innocently' acting under the impression that all things from a drum served the same purpose.[90] While this presumptuousness was certainly more dangerous to himself, the narrative accentuates the danger it posed to cattle. Surely, many 'native servants' unsuspectingly drank dipping fluid, acting under the same impression, and died. Unfortunately, the experiences of innocent, ignorant and presumptive labourers within these

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[83] *The Bulawayo Chronicle*, 26 July 1918.

[84] J.M. Sinclair, 'Arsenical poisoning', *Rhodesia Agricultural Journal* **11** (4) (1914): 614.

[85] *The Rhodesia Herald*, 20 June 1913.

[86] 'Careless handling of dipping fluids', *The Rhodesia Agricultural Journal* **xxvi** (2) (1929): 106.

[87] Report of the Branch of Chemistry for year ending 31 Dec. 1934

[88] E.P. Hodgson, 'Veterinary notes: Arsenic poisoning', *Rhodesia Agricultural Journal* **37** (5) (1941): 233–37.

[89] Reports of the Branch of Chemistry, Dec. 1934, Dec. 1936.

[90] 'Poisoning by arsenic: Warning to stock owners', *The Rhodesia Agricultural Journal*, **xxxi** (1934): 11–13.

toxic colonial workspaces are suppressed and can only be imaginatively reconstructed. Arsenic dips could be absorbed into the blood through the skin leading to either acute or chronic poisoning. The American government issued a warning in 1920 emphasising that 'carelessness' in handling of arsenical dips could result in loss of human lives.[91] Slow poisoning of labourers handling these dipping solutions inevitably occurred. A medical opinion expressed in the *British Medical Journal* in the 1960s revealed that arsenical *Epiothelimata* of the skin occurred more 'frequently' in Southern Rhodesia amongst young Africans who had been in contact with arsenical dips.[92]

Cattle dip tanks also leached arsenical fluids, poisoning water, grass and soils. Reports from the Branch of Chemistry confirmed that leaks of arsenical fluids from faulty dip tanks were contaminating underground water supplies and wells.[93] Investigations revealed arsenic contamination of water wells from leaching dip tanks as high as seven grains per gallon (120 parts per million (ppm)[94] of arsenic oxide).[95] This was way above the British maximum arsenic tolerance level set up in 1901 which was 0.01 grains per gallon (0.17 ppm) for liquids and 0.01 grains per pound (1.4 ppm) for solids.[96] Arsenic also crept from cattle bodies into the human food chain. In 1912, alarm was raised by two South African medical experts Dr. James Allan and Dr Tomorry who claimed that a gastro-enteritis and dysentery epidemic in the country was due to wholesale arsenic contamination of dairy and beef products in every district of the country:

> No one can quite escape this danger, not even the child at its mother's breast. We will never know how many people have already died, from this arsenic poisoning, or how many it may destroy into the future, but we may be certain that as long as this cattle dipping is continued our food will contain arsenic and disease and death will result from it.[97]

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[91] *The Rhodesia Herald*, 6 April 1920.

[92] Correspondence by Gerard. J. Burke from Welcome Research Laboratories in *British Medical Journal*, 21 Sept. 1968.

[93] Annual Report of the Branch of the Chemistry, Dec. 1948.

[94] The presence of arsenic is measured using parts per million. 1 part per million is the equivalent of 1 milligram per litre or 1 milligram per kg. The imperial system made use of grains per gallon, grains per pound, milligrams per 100 grams. 1 grain per gallon =17.14 ppm, 1 grain per pound =140 ppm and 1 milligram per 100g= 100 ppm.

[95] Chief chemist to Secretary department of Agriculture and Lands, 20 Jan. 1947, NAZ, S1215/1786/14.

[96] J. Parascandola, *King of Poisons: A History of Arsenic* (Sterling,VA: Potomac Books, 2012), p. 127.

[97] *The Rhodesia Herald*, 5 Jan. 1912.

The warning prompted concurrent investigations in South Africa and Southern Rhodesia on cattle dipping and arsenic poisoning of milk. Both enquiries concluded that arsenical dips did not result in poisoning of milk as the quantities absorbed were so negligible as to pose no health risk to consumers.[98] However, the reports conceded that 'a certain amount of arsenic' could find its way into the milk'.[99] Also, dairy farmers often expressed concern over scald injuries on the udders of dairy cows caused by arsenical dips and they had to smear lard or Vaseline before dipping.[100] Several random tests conducted on milk and meat also revealed high levels of arsenic contamination.[101] Twelve samples taken from healthy animals slaughtered for food at an abattoir in Salisbury in 1936 tested positive for arsenic with ranges of 0.03–0.33 milligrams per 100 grams sample (3 to 33 ppm/milligrams per kilogram).[102] Other ten samples of thoroughly washed abomasum tested positive with arsenic amounts varying from 0.07 to 0.4 milligrams per 100 grams sample (7-40 ppm/milligrams per kilogram).[103] The investigations attributed the presence of arsenic to dipping. Interestingly, the Salisbury abattoir samples surpassed the British arsenic tolerance thresholds by three to forty times. Also, modern scientific studies have shown that consumption of milk and beef of cattle exposed to arsenic poisoning causes subclinical toxicity in humans and is a health risk.[104] The use of arsenical dips for the control of ticks was standard veterinary practice in Southern Rhodesia for much of the first half of the century, until the 1970s when these dips were replaced by organophosphates and synthetic pyrethrins.[105] Between 1960 and 1969, arsenites were responsible for 54 per cent (118 cases) of human acute poisoning fatalities in the country.

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[98] *The Rhodesia Herald*, 12 Jan. 1912.

[99] For a critique of the threshold theories of harm, see Nash, *Unescapable Ecologies*, p. 142.

[100] *The Bulawayo Chronicle*, 26 July 1918.

[101] *The Rhodesia Herald*, 1 Sept. 1919.

[102] Chief chemist to Secretary Agriculture and Lands, 2 Jul. 1936, NAZ, S1215/1786/4.

[103] Report of the Branch of Chemistry, for the year ending 31 Dec. 1936.

[104] See, B.K Datta et al, 'Chronic arsenicosis in cows in special reference to its metabolism in arsenic endemic village of Nadia district west Bengal India', *Science of the Total Environment* **409** (2010): 284–88; M. Islam et al., 'Arsenic in the food chain and assessment of population health risks in Bangladesh', *Environment Systems and Decisions* **37** (3) (2017): 344–52; M. Islam et al, 'Arsenic and lead in foods: A potential threat to human health in Bangladesh', *Food Additives and Contaminants: Part A* **31** (12) (2014): 1982–92; M.J. Abedin et al., 'Arsenic accumulation and metabolism in rice (Oryza sativa L.)', *Environmental Science and Technology* **36** (5) (2002): 962–68.

[105] D.B. Nhachi, 'Acute pesticide poisoning: Government analyst laboratory records', in C.F.B. Nhachi and O.S.M.J. Kasilo (eds), *Pesticides in Zimbabwe: Toxicity and Health Implications* (Harare: University of Zimbabwe Publications, 1996), pp. 38–49.

Cattle versus gold: Mining landscapes and arsenic poisoning in Southern Rhodesia, 1912–1942: The Cam and Motor Mine arsenic fallout and the Umtali Cattle Commissions.

The colony of Southern Rhodesia was founded in 1890 on the hopes of making a fortune in gold mining. However, by the beginning of the twentieth century the golden dream collapsed.[106] There were no rich gold outcrops in the colony and miners encountered refractory and pyritic ores that required much complex technologies to extract. Unlike surface ores and alluvial deposits that occured in oxidised form, refractory and pyritic ores could only be extracted by other means such as roasting. Roasting oxidises the pyrites and releases the ore for chemical treatment. Iron oxide, sulphur dioxide and arsenic trioxide are released as waste products. While sulphur dioxide remains in gaseous form, arsenic trioxide is a volatile gas at roasting temperature but condenses at lower atmospheric temperatures into a tasteless, odourless but poisonous grey powder sometimes referred to as 'white arsenic'. This grey powder is windborne and cascaded over wide areas in toxic fallouts.

The risks of arsenic fallouts from mining landscapes and the toxic legacies of the mining industry in general have received scant attention in environmental history scholarship until recently.[107] The environmental risks of toxic mining waste were framed in euphemistic terms by colonial officials to construct mitigated narratives about toxicity and health.[108] As argued earlier in this paper, colonial toxic politics prioritised economic and power interests and the construction of scientific knowledge and or ignorance was neither neutral nor objective. Consequently, while cattle had dominated scientific concerns within locust destruction and dipping spheres, their priority dwindled within gold mining landscapes. Gold was more important than cattle and its value as the colony's major export predetermined scientific narratives that absolved miners from culpability in stock poisoning, as this section will

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[106] I. Phimister, 'The reconstruction of the Southern Rhodesia gold mining industry, 1903–1910', *Economic History Review* **29** (3) (1976): 465–81.

[107] See, C. Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017); J.R. McNeill and G. Vrtis (eds), *Mining North America: An Environmental History since 1522* (Berkeley: University of California Press, 2017); T.J. LeCain, *Mass Destruction: The Men and Giant Mines That Wired America and Scarred the Planet* (New Brunswick, New Jersey: Rutgers University Press, 2009); I.D. Rae, 'Mining and using arsenic in Australia', *Icon* **9** (2003): 62–75; I.D. Rae, 'Gold and arsenic in Victoria's mining history', *Victoria Historical Journal* **72** (1–2) (2001): 159–72; LeCain, *The Matter*, pp. 140–82; J. Sandlos, A. Keeling, C. Beckett and Rosanna Nicol, 'There is a monster under the ground: Commemorating the history of arsenic contamination at Giant mine as a warning to future generations', *Papers in Canadian History and Environment* (2019): https://doi.org/10.25071/10315/365116; Pesa, 'Mining waste', 259–84.

[108] Pesa, 'Mining waste', 259–84.

show.[109] Cattle derived a new disposable functionality and colonial scientific experts concealed the scourge of toxic waste from mining landscapes. The legacies of these impunities have endured across generations in most postcolonial landscapes. For instance, toxic waste from historic gold mines constitutes the single largest threat to contemporary South Africa's water resources and human health.[110]

The nemesis of arsenic fallouts from gold mining landscapes in Southern Rhodesia emerged into official discourse in 1914. This followed incidences of suspected cattle poisoning in Gatooma within the environs of Cam and Motor gold mine (see map below). Transport contractors working in the area suffered severe losses of oxen from 'unaccountable causes'.[111] Blood smears by the cattle inspector could not ascertain the cause of death but opinion from an expert and farmers within the area who had their cattle 'mysteriously off-colour' suggested that arsenical dust from the Cam and Motor mine carried far afield by the wind had settled on the grass which the cattle ate and died.[112] A flood gate opened of complaints from farmers on losses of cattle.[113] The government set up a commission of enquiry to investigate the causes. Samples of soil, water, grass and leaves around the exposed areas were taken and tested for the presence of arsenic.

Map 1. Map of Cam and Motor gold mine and surrounding areas, Permission to use map granted by cartographer: Gerald Chikore.

The report of the commission downplayed the risk of arsenical poisoning, despite overwhelming evidence. It concluded that, while fumes from the gold mine contained arsenic that was deposited upon the veld, it was not in 'sufficient quantities' to bring about the poisoning of stock.[114] The report of the investigation acknowledged that arsenic was present

[109] For a comparative discussion on toxicological narratives in colonial landscapes pitting miners versus farmers' interests and arsenic poisoning of stock from mining activities see, LeCain, *The Matter*, pp. 174–81.

[110] J.F. Durand, 'The impact of gold mining on the Witwatersrand on the rivers and karst system of Gauteng and North-West Province, South Africa', *Journal of Earth Sciences* **68** (2012): 24–43.

[111] *The Rhodesia Herald*, 10 August 1914.

[112] Ibid.

[113] Hartley Farmers Association to Chief Veterinary Surgeon, 11 Jul. 1914, NAZ, M3/3/13/1/6B.

[114] Report of the Agricultural chemist and Veterinary biologist into An Investigation into the Suspected Impregnation of the Veld by Arsenical fumes from the Cam and Motor Mine, 10 Dec. 1914, NAZ, M3/3/13/1/6a.

in all the samples of grass, soil and water within the vicinity of affected grazing lands but insisted that the quantities did not constitute an unacceptable toxic risk. The report also highlighted that cattle were very resistant to arsenical poisoning and attributed the mortalities to starvation and drought.

Despite having downplayed the risk of arsenic fallout from the roaster plant as negligible, production figures revealed an appalling picture. Between January and November 1914, Cam and Motor gold mine roasted an average 10,031 tons of pyritic ore per month and vapourised an average 90 tons of arsenic waste per month.[115] Cumulatively, this translated to 1,080 tons of arsenic trioxide waste annually. This apparent arsenic fallout was ignored in the report, which portrayed the scale of chemical exposure in very ambiguous terms:

> Our analysis shows that the proportion which thus escapes has been disseminated over such a very wide area that we failed to find a sufficient quantity in any samples to justify the option that it would bring about the poisoning of cattle. One cannot attempt to estimate what the deposition of arsenic maybe in future, but… it would be advisable to provide an arsenic condensation plant to avoid trouble in the future. As long as existing conditions hold, care must be exercised in the disposal of arsenical dust from the flues and smokestacks in view of the ease with which arsenic is carried by the wind.[116]

However, sceptical voices observed that the 'enormous quantity of arsenic' in the fumes was poisoning the countryside 'to a very dangerous extent'.[117] This risk was not only limited to cattle, but also threatened humans. In January 1915, an inspection report from the Medical Director's office observed that there was the danger of chronic arsenic poisoning amongst the African employees at the mine.[118] The report raised solemn concerns over proximity of workers' dwelling places to the roasting plant and the presence of sublimed arsenic trioxide within residential compound buildings. A subsequent report raised alarm over a 'considerable amount of unaccountable sickness' from dysentery amongst 'natives' on the mine.[119] Later medical studies during the 1950s and 1960s unearthed the generational effects of slow

[115] Government agricultural chemist to Director of Agriculture and Lands, 22 Dec. 1914, NAZ, M3/3/13/1/6a.

[116] Ibid.

[117] Director Agriculture and Lands to Acting Treasurer, 28 Dec. 1914, NAZ, M3/3/13/1/6a.

[118] Medical Director to Treasurer, 9 Jan. 1915, NAZ, M3/3/13/1/6a.

[119] Report of the Inspector of mines on Cam and Motor mine, 11 Feb. 1915, NAZ, M3/3/13/1/6a.

chemical violence on African gold mine labourers.[120] These studies found high incidences of lung cancer, carcinoma of the bronchi and hyperkeratosis amongst African mine workers which was attributed to chronic arsenical poisoning.

The favourable global gold prices after World War I further proliferated arsenic fallouts and pollution in Southern Rhodesia. The state subsidised roasting plants to increase production for the lucrative export market.[121] During the early 1930s, there were outcries from white settler farmers in the Umtali district over 'unexplained' cattle mortalities. This led to a series of scientific investigations into arsenic poisoning on five farms called the Umtali Cattle Commissions. Five farmers in the district; at Battery Spruit, Matika Kloof, Alphaeton, Ferndale and Devonshire were alarmed by unaccounted losses of cattle but suspected undiagnosed arsenical poisoning, since the losses coincided with the inception of gold mining activities in the area.[122] At Battery Spruit, the farmer had lost 48 head of cattle in six months, but the losses had mysteriously halted when a roaster at a nearby gold mine was closed. Many trees between the farm and gold mine had burnt branches and were completely defoliated due to sulphur dioxide fumes. Soil and grass samples taken on the farm revealed 'appreciable quantities' of arsenic. At Ferndale farm, the owner had lost forty cattle in ten years, and many more would have died, but he had slaughtered them for 'boys' meat. Soil samples on the farm showed unusually high levels of arsenic. Maize and rapoko planted by African labourers right up the mine dump contained plenty of arsenic. At Matika Kloof, similar conditions to Ferndale existed, and at Devonshire much of the grazing land contained arsenical mining dumps. At Alphaeston, the dairy farmer had lost £3,000 worth of pedigree dairy livestock including an imported herd of Friesland. Most of the cattle on his farm were emaciated and showing signs of chronic poisoning. Examination of the viscera of one of the animals killed showed a large quantity of arsenic in the stomach. The report concluded that the danger of arsenic poisoning on the farms was accentuated by mining activities and the deposition of arsenical compounds all over during the rainy season. The condition on the five farms was described as 'very serious' since arsenic was also present in the drinking water and grass. Concern was also raised in the report over arsenic contamination of milk, as Alphaeston farm ran a large dairy business that supplied milk in Umtali town.

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[120] See H.S. Osburn, 'Lung cancer in a mining district in Rhodesia', *South African Medical Journal* **25** (1969): 1307–12; H.S. Osburn, 'Cancer of the lung in Gwanda', *Central African Journal of Medicine* **3** (6) (1957): 215–24.

[121] Report of the Que Que roasting plant to be presented to Parliament, 1938, NAZ, S3139/5.

[122] Chief chemist to Secretary Agriculture and Lands, 14 Apr. 1936, NAZ, S1177/6.

The investigation further highlighted the chemical contamination of the human food chain. Samples of cabbages, beans and maize from two of the farms had highly dangerous and fatal levels of arsenic.[123] Figures 1 and 2 below show results from experiments carried out on animal and human food material on the five farms under investigation to ascertain the presence of arsenic and reflect the higher concentrations in maize, beans, cabbages and marjoda, as well as large quantities of arsenic found on a dairy cow's hair at Alphaeston farm. The cabbages and beans were deemed very dangerous for human consumption unless 'washed or cooked'. High concentrations of arsenic were also found in maize cobs and the cumulative effect from eating was posed as uncertain.

Figures 1 and 2. Toxicological report showing results of tests for arsenic conducted on food material on the five farms. Source: Chief chemist to Secretary Department of Agriculture and Lands, 22 May. 1936, NAZ, S1215/1771/2. Photos of archival material taken by author.

This damning report on gold mining and arsenic poisoning prompted the composition of another commission of enquiry in November 1937 to investigate the occurrence of arsenic on the same farms and the extent to which it was responsible for the deaths of cattle.[124] The report released by the second enquiry in February 1938 was much watered down and exculpatory. It dismissed the findings of the earlier commission and only acknowledged cattle losses at Battery Spruit farm. The report emphasised that on other farms chemical evidence of arsenic poisoning had not been firmly established. The emaciated and poor condition of cattle on other farms was attributed to poor pasturage, scanty diet, tick infestations and disease. The shifting of blame for cattle mortalities in toxic mining landscapes to 'unthrifty farmers' and bad husbandry was common in most colonial settings.[125] In glib verbosity, the Commission conceded that arsenic was present on the farms, but its presence had led to 'disingenuous apprehensions' that all cattle troubles were due to it.[126] The report insisted that, while there was the possibility of cattle ingesting arsenic, the possibility of sickness and death was remote because the arsenic was only 'slightly soluble'

[123] Chief chemist to Secretary Department of Agriculture and Lands, 22 May. 1936, NAZ, S1215/1771/2.

[124] Report of the committee appointed by the acting minister of mines and works and the minister of agriculture and lands to investigate the occurrence of arsenic on farms in the Umtali district in Nov. 1937, NAZ, S1177/6,

[125] LeCain, *The Matter*, pp. 176–77.

[126] Report of the committee appointed by the acting Minister of Mines and Works and the Minister of Agriculture and Lands to investigate the occurrence of arsenic on farms in Umtali district in November 1937, NAZ, S1177/6.

in water and dilute acid found in the stomachs of animals. To contest chemical evidence of the presence of arsenic in viscera of dead animals and feeding material, the committee posited a mischievous technicality that, although specimens submitted for analysis showed that arsenic was present in sufficient quantities to cause the death of the animals, it had not been stated that death was due to arsenical poisoning! The report concluded by warning farmers that, 'chemical evidence must support any diagnosis of chronic arsenical poisoning'.[127]

The reports of the Umtali Cattle Commissions and the Cam and Motor mine on cattle poisoning reflected three major ontological aspects in deciphering toxicities in colonial landscapes. The first one is the permissibility of pollution within specific limits and thresholds reckoned acceptable and innocuous. The threshold of chemical pollution was not only the level at which body damage was visible, but the body damage had to be directly linked to the pollutant and scientifically proven. Mere evidence of chemical exposure was not an adequate variable in the spectrum of quantifiable and objective assessments of colonial toxic world views. This was based on the threshold theories of harm and *assimilative capacity* that were in vogue in much of western and colonial thinking about pollution from the 1930s.[128] Consequently, state environmental regulative regimes during this time were largly premised on the bodily harm logic.[129] These thresholds were based on assumptions oblivious of the complex relations amongst organisms. So, in the end assumed and usually unverified toxic tolerances for cattle became yardsticks for 'acceptable' chemical contamination.

The second ontological aspect is about scientific detection of bodily harm. This was highly problematic with cases of chronic arsenical poisoning which were difficult to diagnose and scientifically prove during this time.[130] Hours after ingestion, arsenic could be recognised in

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[127] Ibid., 9.

[128] The threshold theory of pollution and assimilative capacity were derived from Phelps and Streeter who came up with the term to describe the amount of waste that could be discharged into a receiving water source without deleterious ecological effect. See, H.W. Streeter and E.B. Phelps, 'A Study of the pollution and natural purification of the Ohio river. III. Factors concerned in the phenomena of oxidation and reaeration', *Public Health Bulletin* **146** (1925): 1–75.

[129] Liboiron, *Pollution*, p. 5

[130] Chief chemist to Secretary Agriculture and Lands, 2 Nov. 1938, NAZ, S1177/6.

cattle urine and milk but would be eliminated through metabolism and excretion.[131] The rest of the poison would be stored in the body tissue and could only be detected in the hair and epidermis. Thus, while urine samples could detect acute arsenical poisoning, chronic poisoning was much more complex and a matter of much controversy and conjectural prognostications. The veterinary branch conceded in 1936 that a diagnosis of chronic arsenical poisoning in large herbivores was very difficult to arrive at either clinically or through postmortem, as the occurrence of this condition 'had rarely been recorded'.[132] Presence of quantities of arsenic in the hide and hair of cattle was dismissed as evidence of poisoning and considered a result of external exposure to arsenic dust from surrounding gold reefs and mines.[133] Even where anecdotal evidence of arsenical poisoning was much clearer, the effect of chronic non-fatal exposure was hard to prove and, essentially, the bodies remain unrecorded.[134]

The third ontological aspect is that the visibility of bodies is circumscribed by the disposable functionality logic and not white settler scientific benevolence. The hierarchy of functionality was not static and always shifted as landscapes shifted and white settler interests converged and diverged, intersected and dissected. Thus, while cattle and by extension the interests of white settler farmers had preoccupied and influenced colonial toxicological narratives in locust destruction campaigns and dipping landscapes, within the mining landscapes gold and its attendant greater economic significance displaced bovines. Bovines now became functionally disposable and their deaths routinised, their bodies concealed from the scientific glare and mitigating scientific narratives were constructed to conceal the palpable mass stock poisoning. Bovines became the new African humans. After all, 'as with men so are the cattle'.[135]

Conclusion: Reimagining, disembodying, reconstituting and decolonising toxic narratives

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[131] See, G.D. Lander, *Veterinary Toxicology* (Chicago: A. Eger, 1912), p. 38; J.A. Cushny and C.W. Edmunds, *Cushny's Pharmacology and Therapeutics: A Textbook of Pharmacology and Therapeutics or the Action of Drugs in Health and Disease* (London: Lear and Fabiger, 1928), p. 690.

[132] Director Veterinary research to Secretary Department of Agriculture and Lands, 11 June 1936, NAZ, S1177/6.

[133]Chief chemist to Secretary Agriculture and Lands, 14 Oct. 1938, NAZ, S1786/12/3.

[134] LeCain, *The Matter*, p. 179.

[135] R. Broglio, 'On vulnerability: Studies from life that ought not to be copied', in Landes, Lee and Youngqist (eds) *Gorgeous Beasts*, p. 74.

The chemical violence of colonial encounters in Africa is an occluded terrain. The official colonial archival memory selectively presents fragmented experiences of domestic animals and humans in disparate settler-centric political discourses. In these discourses, humans and cattle are framed as subject disposable bodies and this nullifies their agency. They are objects for white settler economic advancement and their imperative is confined to their functionality within the disposability equation. The bodies are therefore ephemeral and transient, only visibilised within the matrix of white settler power interests and not because their deaths matter. They are prescribed to die in the service of colonial capital. In such circumstances, historical reconstruction must not be guided by the quest for physical and enumerable subject human and animal bodily experiences. We must find new ways of reading the archive that privilege imaginative recreations of fragments of the visible entities and vicariously disembodying and embodying the multiple species to relive their shared experiences. The case study has shown through vicarious imagination that the poisoning of bovines within chemicalised colonial landscapes presented in the archives are not discrete encounters of dying cattle. Rather, they are connected to other species, including humans who were also victims but are buried to scrutiny. Our approaches must reimagine the chemical relations through the lenses of racial power structures to disembody the visible and embody the invisible entities. Eventually, this new approach must produce effective and urgent histories that illuminate the omnipresence and infiniteness of imperial chemical violence, its durable and enduring potency in the alteration of bodies, cells and forms of life.

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