ISSN 2319-5339 (P), 2583-7591 (O) IIS Univ.J.A. Vol.14 (2), 1-19 (2025)

Books in the Biosphere: Plants, Insects and Print Culture

Invited Paper delivered as a virtual Talk at the *Sixth Prof. N.K. Jain Memorial Lecture,* organized at IIS University, Jaipur (Rajasthan, India)

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Abstract:

Like disciplines across the humanities and social sciences, studies of print media and book history are grappling with how to address the monumental challenges of the Anthropocene. How does one put together the dry technology of the book with floods and rising sea-levels? The speaker builds on her recent book Dockside Reading, to relocate print culture in an ecosystem of plants, animals, minerals, water, soil and air – or, in a word, the biosphere. The lecture explores these themes through three cases: Books in the Elements; Insects and Colonial Archives; and, Plant, Politics and Print.

Keywords: Anthropocene; Archives; Biosphere; Elements; Print culture.

Introduction

Let me begin with an account of a recent experiment I undertook in my Johannesburg garden. This involved taking a copy of JM Coetzee's novel Disgrace and placing it in a shaded portion of the garden and watering the book regularly. I then photographed the book as it was gradually overtaken by fungus and insects.

Let me hasten to add that I have great respect for the novel and was in no way attempting to bury it. Rather the experiment formed part of a project

* *Book Destruction from the Medieval to the Contemporary,* Gill Partington and Adam Smyth (eds) (Basingstoke: Palgrave Macmillan, 2014); Joshua Calhoun, *The Nature of the Page: Poetry, Papermaking, and the Ecology of Texts in Renaissance England* (Philadelphia: University of Pennsylvania Press, 2019).

** Partington and Smyth, Book Destruction.

*** John Durham Peters, *The Marvelous Clouds: Toward a Philosophy of Elemental Media*

that I'm currently pursuing called 'Books in the Biosphere: Print Culture and the Anthropocene'. Very briefly, the investigation is a print culture enterprise that asks how we might think about the dry technology of the book in the coming floods and catastrophes of the Anthropocene. It takes the dry, indoor technology of the book outside and immerses it in the elements, both analytically and actually. I'm tracking books that end up in water, books that are buried, books that are burned and so on. In thinking about books in the air and the atmosphere, I've done work on insects in archives. This focus on insects has in turn lead me to plants.

In broad terms, this investigation is an attempt to bring together book history and environmental humanities. I am by no means the first to do so and there is now a burgeoning field taking shape at this intersection. Scholars investigate the ecological footprint of book production, and the changing nature of preservation and archives in the Anthropocene where permanent supplies of electricity and air conditioning can no longer be assured. Other themes include printed books becoming waste and entering landfills in the digital age. These themes intersects with growing scholarship on the environmental entanglements of digital media itself.

Joshua Calhoun, an early modernist, explores paper-making and the organic nature of the page, asking "How has human communication been altered by the corruptibility of the nonhuman matter used to make texts?". As Calhoun indicates, modern readers, and scholars in particular seldom recognize "the plants, animals and minerals in their media", thanks to chemicals, electricity and air-conditioning that keep documents in a state of suspended decay.

This essay focuses on the theme of plants and insects, both in and as media and presents two short case studies – first on plants and print, and

(Chicago: University of Chicago Press, 2015); Nicole Starosielski, 'The Elements of Media Studies', Media+Environment 1 (1) 2019: 1-6; Melody Jue and Rafico Ruiz (eds), Saturation: An Elemental Politics (Durham, NC: Duke University Press Books, 2021).

**** *Calhoun, The Nature of the Page. The online edition used has no page numbers.*

***** *Michael Marder, Plant-Thinking: A Philosophy of Vegetal Life (New York: Columbia University Press, 2013); Natania Meeker and Antónia Szabari, Radical Botany: Plants and Speculative Fiction (New York: Fordham University Press, 2020); Sumana Roy, Plant Thinkers in Twentieth-century Bengal (Oxford: Oxford University Press, 2024); Yota Batsaki, 'The Plant at the End of the World: Invasive Species in the Anthropocene', Critical Inquiry 50 (4) 2024: 585–609; The Language of Plants: Science, Philosophy, Literature, Monica Gagliano, John C. Ryan, Patricia Vieira (eds) (Minneapolis: University of Minnesota Press, 2017).*

then on insects in archives. The first section explores how plants generate texts. The second section explores what it means to read for insects in the archive.

Plants and Print

We begin with plants, or more specifically, the plant humanities, or critical plant studies, a rapidly growing area of study stimulated by developments in the plant sciences which focus on plant sentience, agency and intelligence. These themes have in turn been taken up by humanities scholars exploring the intersection of environmental humanities, plants sciences, art and aesthetics, philosophy and ethics. One credo of the field has been to think about plants in material and concrete terms as much as in the representational and metaphorical realm. Put differently, we need to think about plants lives rather than just plant life in the abstract, we must turn our attention to the actual rather than just the symbolic plant.

Let me heed this advice and introduce an actual plant, or rather dried plant that I encountered in the state archives in Cape Town. Tucked in an envelope marked 'On His Majesty's Service', the plant (Lophiocarpus polystachyus) was collected by a farmer in the far north of what is now South Africa in June 1906. He was concerned that the plant

was affecting his livestock and posted a sample, requesting identification from the herbarium in Cape Town.

As the inscription on the envelope indicates, the specimen of Lophiocarpus polystachyus has been pressed into service and has entered the mills of governance. Tracking the lives of plants through colonial state archives makes us aware of them as governed objects but also as lenses on that governance. As plants move around the world and especially across colonial biotic borders, they generate

sheafs of documentation: certificates for plants sent by post; inspection of plants in transit; fumigation documents; quarantine certificates and so on. These printed documents were used to govern the plant in transit, determining where it could and couldn't go. Yet, the vitality of the plant often

****** *CVS 1/13, 24, Poisonous Plants and Poisoning of Livestock. Tulp, 1905–1921, Western Cape Archives, Cape Town.*

******* *Isabel Hofmeyr, 'Vegetal Diasporas: Colonial Borders, Plant Inspectors and Textual Form', in Literature and Migration, Jo McDonagh, Hadji Bakari, Charlotte Susman (eds), forthcoming.*

outstripped these directives. Seeds germinated, roots sprouted, cuttings decayed, vegetables developed wet rot, exceeding the strictures of these forms and requiring new ones to be generated. Plants also affected each other phytosemiotically,

The plant itself stands as an image, in miniature, of border governance, a potentially contaminated object that had to be cleansed before entry is permitted. In this guise, the plant offered a model for how to govern other tricky items. As I've shown in Dockside Reading, customs officials scrutinized printed matter entering colonial ports to see whether it was subversive. At times the treatment of plants acted as a model for their censorship work. Incoming plants were scrutinized by plant inspectors and diseased specimens could be refused entry. These protocols offered customs officials a model for how to conceptualize their works as censors. The content of subversive publications is understood as a troublesome substance rather like a microbial disease similar to what might lurk in plants. Subversive books come to be managed as a form of contaminated plant life.

We have thus far, examined two ways in which plants generated texts, firstly when they travelled across borders and secondly by offering a model for how troublesome items like books might be managed. There were also further ways in which plants generated texts – as medicinal substances that brought advertisements and pamphlets into being, and on herbarium sheets where a cluster of mini-texts surround the dried specimen. We turn to consider each of these through a focus on Commelina africana.

The Textual Lives of Commelina Africana

Commelina africana is a perennial, spreading herb, widely recognized for its medicinal properties, and known in English by the reprehensible term "Yellow Wandering Jew".

I first encountered this species as idangabane in an isiZulu pamphlet

******* *Isabel Hofmeyr, Dockside Reading: Hydrocolonialism and the Custom House (Durham: Duke University Press, 2022).*

******** *Karen Flint, Healing Traditions: African Medicine, Cultural Exchange, and Competition in South Africa, 1820-1948 (Athens, Ohio: Ohio University Press, 2008). GES 25/30M, Native Medicine Men (Inyangas), 1940-1941 and MSCE 1837/1946, Hlatswayo, Nathaniel, both files in Kwa-Zulu Natal Archives, Pietermaritzburg. Mafavuke Ngcobo was born Nathaniel Hlatswayo in Southern Rhodesia.*

advertising the remedies of Mafavuke Ngcobo who ran a large 'muthi' (medicine) mail order empire from Durban in the 1920 and 30s. Displayed prominently on the pamphlet was the logo for his company, namely idangabane. The pamphlet formed part of a file in the national archives in Pretoria and contained the proceedings of a prosecution against Ngcobo, a trial engineered by white pharmacists in Durban, themselves trying to muscle in on this 'muthi' market, and seeking to prevent African practitioners from using biomedical procedures and requiring them to limit themselves to 'traditional' remedies.

Ngcobo's choice of idangabane as logo made sense given that the species is extremely tenacious and can establish itself quickly on disturbed ground, summarizing the circumstances that Ngcobo himself faced. The pamphlet advertised a range of Ngcobo's remedies, arranged rather like a textual apothecary. For those who received the pamphlet and decided to buy the wares offered, the document did more than simply convey information. Instead, it might have formed part of the therapeutic chain through which 'traditional' healing operates, drawing together dreams, ancestral messages, plants, ochres, animal products, patient and healer. The medicine received in the mail did not work alone but was a member of an imagined team distributed across a number of agents (Ngcobo himself, the locales from which herbs and other ingredients had been gathered, dreams and signs, ancestors etc) including the pamphlet which joins this assemblage. As such, the pamphlet constitutes a mobile and dynamic southern African literary form, in part generated by the chemical character of Commelina africana which meshed with human health needs as well as its ruderal character which translated into the logo.

Having encountered idangabane in one archival context, I then explored it in another, namely in various herbaria – the National Herbarium in Pre-

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********** *Bettina Dietz, 'Herbaria as Manuscripts: Philology, Ethnobotany, and the Textual–visual Mesh of Early Modern Botany', History of Science 62 (1) 202:3-22. There is an extensive scholarship on the histories and technologies of herbaria. I have drawn on María M. Carrión, 'Planting Dwelling Thinking. Natural History and Philosophy in Sixteenth-century European Dried Gardens', Sciendo, 6 2019: 5-19; Maura C. Flannery, In the Herbarium : The Hidden World of Collecting and Preserving Plants (Boston: Yale University Press, 2023); Alette Fleischer, 'Leaves on the Loose: The Changing Nature of Archiving Plants and Botanical Knowledge', Journal of Early Modern Studies 1 2017: 117–135; Pina Milne, 'Retracing History through Herbarium Specimens', Studies in Western Australian History 35 2020: 75–87. On the history of herbaria in South Africa, see Jane Carruthers, 'Trouble in the Garden: South African Botanical Politics ca.1870–1950', South African Journal of Botany 77 (2011) 258–267.*

********** *The items discussed here are all drawn from Commelina africana specimens in the National Herbarium, Pretoria.*

toria, the Kwa-Zulu Natal Herbarium, the CE Moss Herbarium at the University of the Witwatersrand, as well as William Burchell's specimens of Commelina africana in the Kew Herbarium.

How might one read these dried plant specimens, and how might this relate to Ngcobo's logo? As Bettina Dietz has noted, the herbarium sheet constitutes one of the many "knots in the textual-visual field of botany". Premised on the decontextualized botanical illustration which extracted plants from their settings and made them portable, the herbarium sheet translated a three-dimensional plant into a two-dimensional specimen. The dried plant matter (for the dried garden, hortus siccus, the original term for a herbarium) is 'specimenized' through the visual strategy of its layout and the galaxy of miniature texts that surround it: these include details of where, when and by whom the plant was collected, stamps of the hosting herbarium, notes in pencil, maps, tags, stickers, drawings, tiny envelopes (fragment packs) containing seeds and flowers, and more recently the name or initial of the person doing the mounting. The information of where and when the plant was collected inducts the specimen into Gregorian time and conjugates its past living life with its present dead paper life. It also immerses the specimen into English and Latin with some German, French, Italian and Afrikaans. There are vanishingly few terms in African languages although this has shifted with very recent specimens. ********

The details of where the plant was collected points to its life histories and journeys which can be long and multiple, as specimens moved between herbaria or as small private collections were consolidated into larger ones. Many specimens made long journeys northwards, creating the current "inverse relationship between where plant diversity exists in nature and where it is housed in herbaria" (in Banu Subramaniam's terms, "a global mortuary"). As these sheets travelled, they did at times carry local meanings with them, such as popular names for the plant like "kannie dood" (can't die) or pigweed (the species was used as feed for pigs). Descriptions like "pioneer of the ploughed field" or "cure for backache" remind us of its ruderal and medicinal properties. At times, the brief descriptions of its locale have a lyrical quality and when some of these are strung together create a poem that captures a faint echo of the plant's presence.

********** Daniel S Park et al, 'The Colonial Legacy of Herbaria', Nature Human Behaviour 7 2023: 1059–68; Banu Subramaniam, The Botany of Empire: Plants Worlds and the Scientific Legacies of Colonialism (Seattle: University of Washington Press, 2024), 74.

Beside a stream
Weed-crawl
Leaves folded – like a small ship
Sandy soil
Yellow flower

The individuality of each plant can sometimes be apparent from its stubborn materiality. Despite being a largely creeping herb, some specimens are long and have to be folded over double, while others are pasted downwards or sideways, upsetting the implied model of botanical illustration where plants are always upright and neatly scaled to the page. Elsewhere plants that have not been properly dried create a 'caul' around themselves as the moisture seeps into the page, often buckling it at the same time. The particular size and shape of the specimen creates a varied aesthetic across the exsiccatae (collection of dried specimens). Some specimens are tiny, huddling on the page like squashed calligraphy. Others swirl like arabesques, or are elegantly minimalist like an ikebana arrangement. Yet others sprawl across the folio sheet and are pasted down with numerous parallel pieces of tape so that it looks as if the plant is behind a fence. In some cases, the mounting seems to suggest a new species, for example where a profusion of glue dots creates the impression that Commelina africana carries white blossoms.

Let me draw some conclusions across Ngcobo's idangabane and these herbarium specimens. In both instances, the morphology, chemical composition, and life history of the plant help to shape particular texts whether the pamphlet (in its several capacities as advertisement, healing agent, and as part the evidence in the case); the miniature descriptive texts that surround the specimens telling us of the plant's journey and life histories; the aesthetics of the page with its the visual-textual knots – all these are

********** A longer version of this paper appears in Kronos 50 (2) 2024.

********** Beetles Public Coleoptera, SAB, CEN 1093, SF 74/1, 1949–1959; Fish Moth Public, SAB, CEN 1093, SF 77/1, 1932–1945; Weevils General, SAB, CEN 1103, SF 240/1, 1938–1944.

********** Under Sec of Agriculture to Sec of the Law Dept , 5/2/1910, Extermination of the Paste Beetle (Sitodrepa Panacea), KAB, AGR 629, T197, 1907–1910.

********** Anobium in SG Records, KAB, LND 1/717, L11454, 1898–1901; Bestryding van Insekte, SAB, ARH 181, 25/4, 1959–1961; Extermination of the Paste Beetle (Sitodrepa Panacea), KAB, AGR 629, T197, 1907–1910; Poisoned Paste and Eradication of Paste Beetle from Archives, UOD 99,Z32/12, 1912–1916; Re: Extermination of the Paste Beetle in Records, KAB, T 1184, 2498, 1909; Damage Done by the Paste Beetle, KAB, AGR 456, 3439, 1901; Extermination of the Paste Beetle in Records, KAB, AG 1872, 19387, 1909–1910.

********** Official Correspondence. Fumigation of Documents in the Archives, KAB, CAD 1/1/1, 5, 1912.

enmeshed with the materiality of the plant itself and needs to be read in conjunction with the species in general, and certain plants in particular.

Let's turn now to our second case study whose setting is the Cape colonial archives circa 1910.

Insects in Archives [********]

The intray of the government entomologist not infrequently resembled an insectarium. Exasperated gardeners and worried householders posted bugs, dead and alive, in envelopes, tins, match boxes, and bottles, seeking remedies for their ruined carnations and vermiculated floors. One morning in February 1910 in Cape Town, two flasks of insects arrived, dispatched by the Attorney General's office where they had been discovered in the records of the registrar of deeds. The state entomologist, Charles Lounsbury, was quick to recognize the creatures as the paste beetle, or more properly Sitodrepa paniceum (today Stegobium paniceum). Their "ravages in stored volumes of records" were well-known to Lounsbury and "have been the theme of many memoranda from this Office during the past fourteen years". .[********]

Over those fourteen years, an array of arthropods in both their larval and adult forms had taken up residence in collections of government documents and the shelves that housed them.[********] These included furniture beetles, biscuit beetles, paste beetles, fish moths, cockroaches, white ants, book lice, and weevils, known collectively and misleadingly as "bookworms". These creatures had in turn been assailed by a range of chem-

[********] Rohan Deb Roy, 'White Ants, Empire, and Entomo-politics in South Asia', The Historical Journal 63 (2) 2020: 411–36, https://doi.org/10.1017/S0018246X19000281.

[********] Torgeir Rinke Bangstad, 'Pollution and Permanence: Museum Repair in Toxic Worlds', Museums & Social Issues 15 (1–2) 2021: 13–27, https://doi.org/10.1080/15596893.2022.2083356; Torgeir Bangstad, 'Toxic Heritage: Coal Tar, Care and Chemical Intimacies in Museum Housekeeping', Journal of Contemporary Archaeology 9 (1) 2022: 121–38, https://doi.org/10.1558/jca.21609.

[********] John F. M. Clark, Bugs and the Victorians (New Haven: Yale University Press, 2009); Frank A. von Hippel, The Chemical Age: How Chemists Fought Famine and Disease, Killed Millions, and Changed Our Relationship with the Earth (Chicago, IL: University of Chicago Press, 2020), https://press.uchicago.edu/ucp/books/book/chicago/C/bo49298855.html.

[********] Calhoun, The Nature of the Page. There are no page numbers in the online version.

[********] 'Preservation of Books in the Tropics', Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew) 1894 (91) 1894: 217–18, https://doi.org/10.2307/4118211; Harry Bischoff Weiss and Ralph Herbert Carruthers, Insect Enemies of Books (New York: New York Public Library, 1937), 34.

[********] 'Uganda Handbook', East African Chronicle, Dec 18 1920, 3.

[********] 'Hints on Bookbinding for the Tropics', British and Colonial Bookbinder and Stationer (Bookbinding Edition), May 9 1912.

icals in powder, aerosol, liquid and gaseous form: corrosive sublimate, carbon bisulphide, sulphuric acid, methyl bromide, cyanide of potassium, hydrocyanic acid, paraffin oil, naphthalene and so on. These fumigations, sprayings and sprinklings had met with mixed success, and reports of insects, plus the insects themselves, continued to make their way to the intray of the government entomologist.

While miniature in scale, this intersection of insect, paper and chemicals has prompted scholars to explore larger themes. Through following the trails of white ants, Rohan Deb Roy has discussed the entomopolitics of the imperial state.******** Other researchers have traced the chemical legacies in museum and archival collections and their implications for the restitution of objects. .******** Related themes include the imperial formation of entomology, largely shaped in 'the tropics', and the intertwined histories of war, insecticide and genocide. ******** Print culture and book history suggest further productive angles, especially as regards the ecology of texts. Can we, as Calhoun urges, recognize "the plants, animals and minerals in their media"? ********

The case of the paste beetle by contrast draws attention to the nonhuman matter in texts and processes of decay. Leather and cloth bindings, starch paste, animal glues, cellulose-based paper and cardboard, and mold, all offered opportunities for larval and in some cases adult feeding of 'stack pests'. Archivists had to scrutinize their volumes, attending to different kinds of bindings and paper, with reports from the Antilles and Calcutta indicating that the "cosmopolitan book-maggot" favoured red bindings and chose French paper over English. ********

These latter discussions cohered under the rubric of "books in the tropics" where enemies of the codex were deemed to be plentiful. As self-appointed custodian of 'the book', the colonial state was ever keen to defend its volumes against such enemies. In 1920, the government printers of Uganda produced an official handbook which carried a slip indicating that the solution used for binding would "render the work impervious to the ravages of insects". ******** In similar vein, the Bureau of Printing for the Government of the Philippines experimented with different glues and

******** Weiss and Carruthers, Insect Enemies of Books, 34.

******** Rudy Plarre, 'Stored Products as Habitats', in *Encyclopedia of Insects* (Amsterdam: Academic Press, 2009).

******** Emma Maggie Solberg, 'Human and Insect Bookworms', Postmedieval 11 (1) 2020: 20, https://doi.org/10.1057/s41280-020-00162-z.

bindings, inserting printed slips into their publications, asking users to write back, reporting on the condition of the binding and the state of the book generally. ********

We tend to think of books as reasonably resilient objects, but in 'the tropics', the codex became a vulnerable object that required chemical armour to survive. In 1869 German book manufacturers recommended that volumes "exported to the tropics should be protected from insect attack by the application of alum and corrosive sublimate and a shirting [book-binding gauze] should be applied to the still wet poison lacquer".

In 'the tropics', the organic substrate of the book came to the fore and, as we shall see, supported a number of unusual and unexpected definitions of the book. In setting out this story, we begin with insects in archives, then examine state responses to them, and conclude with what this means for definitions of books and literary genres. While the insect community in any archive was varied, one could always be assured of finding members of the family Anobiidae (borers), who went by a range of colloquial names in different parts of the world: biscuit beetle, drug store beetle, tobacco beetle, bread beetle and in the Cape archives, paste beetle. As these names suggest, these food opportunists have been inhabiting human provisions for millennia and today are generally discussed under the category of "stored product insects". Following this logic, we might refer to them as "stored book insects", a niche they have been occupying ever since codexes, manuscripts, books and paper have been around.

Stored books offer an ideal habitat for borers: concentrations of cellulose and protein in a dark, quiet, and in some instances, temperature-controlled environment, largely free of predators. Most 'bookworms' probably arrived through already inhabited volumes although some must have located their own biblio-habitats using skills of semio-chemical detection and colour recognition (possibly explaining the often-noted popularity of red bindings). Adult females deposit eggs on, or in the volumes and the paper-eating larvae burrow minute tunnels into the volume, producing the tiny 'shot-hole' effect that one often encounters in old books. Under ideal temperature and humidity conditions, the larvae spend one to two months in their books, before pupating, after which the adults emerge. With a life span of two to three weeks, the adults fly (or possibly stroll) to the next suitable volume, before eggs are again oviposited.

As Emma Solberg in her wonderful article "Human and Insect Bookworms" indicates, bibliovores treated books like habitats, akin to a log,

burrowing in its outer perimeter: "Conveniently for us, bookworms prefer the exteriors and the edges of books to the interior or the center. They tend to make their tunnels, holes, and burrows in the covers, gutters, and margins".

Yet, in treating books like plants, insects must have considered them as rather sad specimens of vegetation, unable to produce any of their own defences. Most plants and trees have a range of protective mechanisms against herbivorous insects (or at least those with which they have co-evolved). These include 'alarm' chemicals that alert other plants to danger or can attract predators; compounds which disrupt insect metabolism; mechanical adaptations like closing on touch (and hence dislodging the bug); and resin to force out borers. Without any of these, books must have resembled failed plants, a concentration of cellulose unable to defend itself in any way.

This physical presence of insects was not the only mode in which insects occupied archives. A goodly percentage of the files of the entomology department are arranged around particular species, so that the insect itself shapes bureaucratic categories. Files also contain drawings and photographs of insects. Since many of the prophylactic strategies used like naphthalene, creosote, shellac, and paraffin oil were strongly scented, archival staff and users must have been constantly reminded of the presence of insects by these odours. Another reminder came with fumigation when all or parts of the archive were closed.

Archivists and Insects

Chemical fumigation in the Cape archives arrived at more or less the same time as its use in two other locales: firstly, orchards and vineyards, and secondly, Cape Town harbour. Like pesticides in many parts of the world, those on the fruit trees and vines of the Western Cape were the product of US expertise and experiment. Leading the local charge was Charles Lounsbury, the first government entomologist appointed in 1895, a twenty-three year-old fresh out of the Amherst Agricultural College and Experimental Station. Like his mentors, Lounsbury was a great propo-

******** C. P. Lounsbury, 'The Pioneer Period of Economic Entomology in South Africa', *Journal of the Entomological Society of Southern Africa* 3 (1)1940: 9–29, https://doi.org/10.10520/AJA00128789_2400; Karen 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, https://doi.org/10.1080/03057070306203.

nent of pesticides, seeing them as a necessary technology that could make farming in South Africa modern. The second site, Cape Town harbour, like most imperial ports, had been carrying out sulphuric fumigation of ships since the 1880s and in 1895 extended fumigation to the dockside, adding a plant fumigator, and in 1901, a steam disinfector.

As with many life forms in the Cape colony, the fate of the insects in the archives was shaped by capitalist agriculture, on the one hand, and colonial maritime border-making, on the other. There are of course myriad other factors one could list, but for the moment, let's stick with these two, since it was the state departments associated with them which advised the archives on how to address their insect problem. The first, and most frequently called upon, was the entomological division; the second, the Immigration department (which along with the port health officer oversaw fumigation). The ways in which insects encountered chemicals in the archives were hence offshoots of the fumigation practices and protocols of these two divisions.

Lounsbury's department defined its mission as 'economic entomology' with a major focus on 'injurious' insects that affected those plants and crops (and their produce) of interest to humans. The recommendations that entomologists made to archivists were informed by their experience of dealing with insect infestations in plants and stored goods. In proposing the use of methyl bromide in archives, a report, probably from the 1920s spoke only of its effectiveness in relation to eradicating insects on plants and in stored food, not archive settings. After noting the chemical's "properties of penetration which make possible the destruction of certain sheltered pests such as leaf miners, borers, mites and other internal feeders", the report praises the ability of methyl bromide to disinfest quarantined produce and plants, whether imported Christmas trees, narcissus bulbs, green coffee beans, or dehydrated soups. A section "Plant Reactions" indicates that "in general, living plant material is unaffected

******** Official Correspondence. Fumigation of Documents in the Archives, KAB, SAB, 2/1/1/2, C1/5–C2/6/1, 1913.

******** Official Correspondence: Eradication of Paste Beetle, KAB, CAD 1/1/1, 5, 1912.

******** Poisoned Paste and Eradication of Paste Beetle from Archives, SAB, UOD 99, Z32/12, 1912–1916.

******** Anobium in SG Records, KAB, LND 1/717, L11454, 1898–1901.

******** Housing, Cape Archives: Fumigation of Records (1953 1944), 2/1/1/2, C1/31, KAB, CAD.

******** Isabel Hofmeyr, Dockside Reading: Hydrocolonialism and the Custom House (Durham: Duke University Press, 2022), https://ebookcentral.proquest.com/lib/nyulibrary-ebooks/detail.action?docID=6798668.

by ordinary doses of methyl bromide, although any plant can be injured by overdosages or careless attention to detail."

How paper might react to the compound was never broached, although some archivists did point out that some 'remedies' adversely affected paper and ink. Most archivists however deferred to the entomologists, following their advice or that which came from the museum herbarium (whose original source would in any event have been the entomology division). The Kew Herbarium was also a respected authority. In the 1940s, archival documents were fumigated at the Entomological and Plant Quarantine Station in Rosebank, Cape Town, a practice that further reinforced the link of document and plant. For entomologists, the archives were subsumed into the logic of insect control in plants – archives were implicitly a species of herbarium, their documents and volumes like so many closely-packed leaves.

Whereas the entomologists saw the archives as a type of mono-crop in need of pesticide, the Immigration department approached the problem from a framework of contaminated ships and cargo. From this perspective, the insects may have seemed like miniature rats running riot; the volumes like infested blankets or second-hand clothing in need of disinfection. The port authorities had long seen books as slightly suspect objects, containers of dangerous foreign ideas and vectors of contamination, intellectual rather than bacterial, but contaminants, nonetheless. Left to his own devices, the chief immigration officer would probably have ordered the infected archival volumes burned in the "destructor" (as furnaces were known). Schooled in maritime fumigation, immigration officers were wedded to sulphuric forms of disinfection for ships; steam disinfection for cargo and luggage; and, as indicated,

where all else failed, disposal in the "destructor". These techniques did not map well onto the archive and when consulted for advice, immigra-

******** Lukas Engelmann, Sulphuric Utopias: A History of Maritime Fumigation (Cambridge, Massachusetts: The MIT Press, 2019), https://doi.org/10.7551/mitpress/12437.001.0001?locatt=mode:legacy.

******** Official Correspondence: Eradication of Paste Beetle, KAB, CAD 1/1/1, 5, 1912.

******** Lukas Engelmann, Sulphuric Utopias.

******** Hippel, The Chemical Age.

******** Peter Hayes, From Cooperation to Complicity: Degussa in the Third Reich (Cambridge: Cambridge University Press, 2004), https://doi.org/10.1017/CBO9780511550805.

******** South African Fumigation Co (Pty) Ltd (Degesch) Sale of Assets, (1940-1953), SAB, BE, 648 W19/15Q.

tion officials were at a loss, and sought guidance from the Public Works Department (PWD) or from other archivists. Their shaky purchase on the situation emerges from a letter sent by the chief immigration officer to the PWD asking what "drugs" would be required for the fumigation. Their lack of finesse and scientific glamour compared to the entomologists probably only increased their sense that the infested books, and indeed much of the archive, was best burned.

This ham-handedness was further augmented by international shifts in fumigation technologies. Since the 1880s, maritime fumigation techniques had been sulphur-based, but from the early 1900s, cyanide-based methods gained the upper hand. First used in the Californian citrus industry in the 1880s, these latter systems involved derivatives of hydrocyanic gas and were actively promoted by Lounsbury. As these methods took hold, a variety of commercial applications of hydrocyanic gas as a pesticide were developed – most notoriously Zyklon B which was to become a genocidal instrument of the Nazi regime. Patented in Germany in 1923, the compound was actively marketed as a pesticide in several regions of the world, including South Africa where it was used until the 1950s. The German company Degesch which held the patent for Zyklon B had acquired a controlling interest in the Durban-based South African Fumigation Company, until the company was seized as enemy property with the advent of WWII.

Conclusion

Let me move now towards some general conclusions. What larger issues arise from re-locating the book as an elemental medium amongst other elemental media, in this case insect media and plant media. As we've seen, insect media play a role in producing unusual definitions of the book. Insects and entomologists shared an understanding of books and printed matter as failed plants unable to protect themselves and hence having to be saved by the chemical formulas of the entomology department.

The work of insects in books raises further questions about reading, text and archive itself. As Emma Solberg raises the question of reading: "Wormholes, in short, have been understood as damage, as that which gets in the way of reading, not as something to be read". She suggests including wormholes as part of the text, positioning insects as co-writers and readers with humans. Yet, one can't help wondering whether this

******** Solberg, 'Human and Insect Bookworms', 19.

rather benign view arises from the excellent preservation conditions of wealthy libraries and archives in the global north where superb storage conditions, permanent electricity and plentiful resources enable damage to be kept to minimum. As we all know, these are not the conditions prevailing in archives of the global south. How then do we read postcolonial wormholes, assuming of course that one can even get access to the document in the first place?

In part of course this question forms part of a longstanding postcolonial debate on reading in, and for damage, with the aesthetics of unmaking. One route into this takes us on to plants and the idea of the ruderal, namely a plant able to grow on waste or disturbed ground. The plant that Ngcobo adopted in his pamphlet, Commelina africana is such a ruderal plant which offered metaphorical and material resources for Ngcobo's project; plant, person and indeed the printed pamphlet taking route in disturbed and adverse circumstances. In this instance, there is a transposition between the potentialities of plant media, the person and print.

This essay has drawn together insects, plants and print as intersecting forms of media that can resituate the existing conceptualizations of the book as a purely textual object. To return to Calhoun, there is good reason to pay close attention to the plants, animals and minerals in our media.

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