Cotton, Whiteness, and Other Poisons

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Abstract This article examines how racial capitalism has shaped the ecological and technological dynamics of cotton production in the United States South. Cotton's destructive dependence on chemicals and on the extraction of lives and resources was animated and enabled by anti-Blackness, which sanctioned a systematic hostility to life that encoded environmental violence in plantation landscapes from the seed to the root. Agrotechnological notions of scientific progress and development conceived places, plants, and Black people as interchangeable parts. Tracing these trajectories during slavery and after abolition, the article focuses on two dynamics: the use of chemicals to augment soil fertility and manage cotton's ecologies, and the deployment of chemicals to protect cotton monocultures. In both instances, the manipulations of cotton's ecologies and biophysical properties helped maintain plantation profitability and dominance in the face of conjoined crises of political-ecological and racial control. Racialized conceptions of chemical-scientific "innovation," relations of indebtedness, and notions of threat also siphoned capital gains from Black workers and communities. By converting waste products into fertilizers and poisons, planters and industrialists continued to render Black communities, their labor, and their land as fungible but necessary components in the industrialization of racial capitalism.

Keywords chemicals, slavery, political ecology, racial capitalism, agriculture, fungibility, plantations

The technological dynamics of cotton reveal the extractive and destructive core of the political ecologies of racial capitalism. In 1850, US cotton imported by the United Kingdom represented over 616 million hours of field labor alone for enslaved workers in the United States South, and the product of over 1.1 million hectares of land, seized through settler-plantation expansion on a commodity frontier built upon dispossession, appropriation, and enslavement.[1] Cotton plantations are nutrient-hungry, deriving profit from the exhaustion of land and soil. They are also vulnerable to disease and predation by insects,

1. Hornborg, "Footprints in the Cotton Fields."

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ecological crises that monoculture builds over time. These vulnerabilities were at first deferred through extensive expansion of plantation lands through colonial theft. However, as crop after crop of cotton leached nutrients from lands, imported guano in the 1840s began a process of cotton intensification in established plantation regions that was extended over the next century through synthetic pesticides and fertilizers. Such chemical fixes for systemic ecological crises inserted toxicity into a political ecology that already systemically devalued and undermined Black workers' lives and labor.

Analyzing these technological responses to cotton crises, we argue that the ecological destructiveness of cotton production was enabled, animated, and sustained by anti-Blackness. In the post-abolition United States, the political ecologies of cotton's chemicalization were inspired by conflicting concepts of Black workers as both individually disposable and collectively indispensable to cotton's production and profitability. As Black farmers and communities worked to build power and autonomy, postbellum white plantation owners and industrialists depended on technological fixes that undermined the possibilities for Black well-being. Our focus on cotton clarifies how Jim Crow served as a political-ecological regime. Although naturalized and defended by discourses and ideologies personifying "King Cotton" as a hungry and imperious monarch, the technological and chemical fixes to cotton's crises were mediated by racism as a force justifying and ordering the pernicious socioecological consequences of a system built upon insatiable appetites for cruelty and extraction.[2] Cotton was sustained through the racialized differentiation of socioecological risks and profits, work and reward. This enabled an extensive political-ecological catastrophe that persists today. The global socioecological importance of cotton and its chemicalization show how anti-Blackness has shaped the trajectories of global agricultural development and systematically undermines conditions for life and abundance.

Extractive Political Ecologies of Racial Capitalism

The nineteenth and twentieth centuries witnessed profound technological change in the dynamics of agrarian cultivation, production, and exchange. Karl Marx argued that these transformations represented the "pulling-away of the natural ground" of agriculture through the transformation of agricultural production through purchased inputs (such as seeds and fertilizers), increasingly from global markets. For Marx, the transformation of the agrarian political economy through technological intensification reflected capitalism's drive to create conditions of need and necessity as a precondition for expansion. Marx believed that capitalist agriculture leveraged industrial technologies and production against workers in ways that crushed freedom and resistance.[3]

2. Williams, "'Fabric of Our Lives'?," 426–27.

3. Marx, *Capital*, 330. Marx's conceptualization of a "metabolic rift" between the nonhuman world and the social relations of re/production was based on his understanding of soil depletion and the role of purchased fertilizers in agriculture. See Foster, *Marx's Ecology*; Foster, "Marx's Theory of Metabolic Rift."

German chemist Justus von Liebig's critique of soil depletion was central to Marx's understanding of the destructive nature of capitalist agriculture.[4] Liebig's idea that soil fertility and plant growth could be measured in terms of chemical interactions was also revolutionary, in that it provided a referent for capitalist value and enabled "consolidations of meaning through complex fields of people, landscapes and things."[5] By providing a chemical conception of soil fertility, soil science established a technoscientific grammar for the chemical consolidation and expansion of colonial-capitalist farming, laying the groundwork for future "chemical fixes" for agro-industrial crises.[6] This enabled the comparative valuation of the productivity of workers, soils, and nutrients; provided new routes for commodification; and shaped the racial dynamics of agrarian exploitation.

"Soil abstractions" flattened and fixed soils and their "metabolic forces and cultural valences," providing a measurable referent (nitrogen, phosphorous, potassium) for the quantification and commodification of the vital properties of soil and plants.[7] These parallel calculative technologies of abstraction also serve to connect and underpin global ecologies of extraction and exploitation by rendering a whole host of irreducible and incomparable beings, compounds, and objects fungible—that is, interchangeable and exchangeable—upon appropriation. Marx centered extraction and appropriation in his understanding of the foundation of capitalist value: slavery, colonial genocide and land theft, and the imperial acquisition of guano as fertilizer all figured prominently in his scathing indictment of the foundational violence of capitalism. Capital, he wrote, "comes dripping from head to toe, from every pore, with blood and dirt." Capitalist agriculture, to Marx, represents the robbery of the life and labor of workers and of the fertility of soils, and leads to "premature exhaustion and death" for workers.[8]

Yet as Singh has noted, Marx's focus on the foundational violence of slavery and colonialism is intended as an indictment, rather than an explanation, of the dynamics of actually existing capitalism.[9] Though Marx provides a powerful description of capitalist alienation and extraction, he is less perceptive regarding how racism works to produce, sanction, and order violence and premature death at multiple scales, and unevenly distributes power, risk, and profit. As Cedric Robinson emphasized in *Black Marxism*, racism is not an aberration from capitalism's class-based dynamics, nor is racism simply a product of capitalism. Rather, Robinson argues that racial orderings in European society provided the rationalizations, logics of domination, and commitments to violence that were taken up by and reworked by capitalism. What Robinson terms "racialism" served as an ordering logic of exploitation and extraction that gave form to capitalist conceptions and racial regimes and an emergent world system founded on colonialism and

4. Foster, *Marx's Ecology.*
5. Marchesi, "Justus von Leibig," 205.
6. Romero, "Commercializing Chemical Warfare," 18.
7. Marchesi, "Justus von Leibig," 209.
8. Marx, *Capital*, 926, 376.
9. Singh, "On Race," 33–34.

slavery. In other words, from its very inception to its daily reproduction, capitalism is dependent upon racism as a technology of division, coercion, and legitimation.[10]

Racial capitalism is also an environmental formation. Vergès, drawing on Robinson, points to the parallel incorporation of enslaved peoples and nonhuman nature as constant capital. She argues that "racialized chattel were the capital that made capitalism" and emphasizes that "the slave trade consisted of not only the organized deportation of millions of Africans to continents of islands, but also a massive transfer of plants, animals, diseases, soil, techniques, and manufactured goods."[11] These foundations shape the political ecologies of contemporary capitalism: racialized labor systems, the uneven valuation of bodies, and the theft and degradation of land are all central to the realization of value and accumulation of capitalist value, and the violent displacement of crises of pollution and degradation.[12] Capital is indeed accumulated through the depletion of soils and exhaustion of workers, but crucially, racism provides the means and modes for ordering and differentiating capitalism's destructive effects, from the bodily to the global scale.[13] Whiteness, as an effect and structural position of these uneven accumulations of benefit and harm, is born of toxicities both literal and metaphorical.

The political-ecological dynamics of labor exploitation conditioned by racist ideologies during slavery positioned Black workers as exchangeable, and potentially interchangeable. These racialized conceptions permeate plantation discourses of the relationship between Black workers, cotton, and agricultural technologies. Race, writes Kathryn Yusoff, has served as a codification of the "accumulation and placement of certain lives in material and psychic proximity to the inhuman," enabling and organizing material extraction. White geological (and, we would add, agrochemical) imaginaries see Blackness as a marker of both extractability and appropriable energy, as well as a "seismic barrier to the costs of extraction," seemingly insulating white people from the degradation and toxicities of racial capitalism.[14] Racialized labor exploitation is intensified and expanded by ways of visualizing and conceptualizing Black people and places as raw material to be extracted. Indeed, as Purifoy and Seamster have shown, extraction remains a central dynamic in the uneven production of value and toxicity, enabling the development of white communities and white wealth through the uneven accumulation of environmental harms, and through the theft of resources from Black places.[15]

Plantation logics give rise to such geographies of extraction, rendering some places purportedly uninhabitable and lifeless to bolster geographies of possession and

10. Robinson, *Black Marxism.*

11. Vergès, "Racial Capitalocene"; Gill, "World in Reverse."

12. Pulido, "Geographies of Race"; Vasudevan, "Intimate Inventory of Race."

13. Marx, *Capital*; Gilmore, "Fatal Couplings," 16.

14. Yusoff, *Billion Black Anthropocenes*. See also Meredith J. DeBoom's analysis of differentiated extractive violence in DeBoom, "Climate Necropolitics."

15. Purifoy and Seamster, "Creative Extraction."

white wealth. Plantations, McKittrick writes, constituted the political-ecological nexus of colonial dispossession and enslavement, as they were "mapped onto the lands of no one and became the location where black peoples were 'planted' in the Americas—not as members of society but as commodities that would bolster crop economies."[16] The labor of enslaved peoples was central to the colonial establishment of a plantation industrial complex, and enslavers sanctioned destruction with a notion of dominion, or "god-ordained exploitation and defilement for profit."[17]

But analytics of labor do not fully explain how anti-Blackness animates destructive political ecologies of mastery, dominion, and genocide.[18] For Hartman, the fungibility of the enslaved—the "replaceability or exchangeability endemic to the commodity"—subtended the symbolic, analytical, material, and libidinal projection of mastery and settler-colonial spatial dominion.[19] Analyzing an illustrated eighteenth-century colonial map, King examines the ways that Black people were "rendered repetitive, standardized, and symmetrical replications of one another" in the process of the chemical-industrial transformation of indigo (a colonial plantation commodity crop) into dye.[20] Rosenthal has shown that enslavers developed depersonalizing calculations in attempts to optimize the value they could extract from enslaved people, both as chattel property and as laborers.[21] "Nearly identical language," Rosenthal writes, "was used to categorize slaves and agricultural crops like grain and cotton."[22] This was not simply an economic calculus but was a means of regulating industrial ecologies by measuring and manipulating, in Johnson's words, the "process by which human capacity and earthly fertility were metabolized into capital."[23] Ideologies and modes of calculation positioned people as productive commodities that could appreciate or depreciate in value, oriented plantation agriculture around an extractive and destructive epistemology that extended beyond dynamics of labor exploitation, and persisted after formal abolition. By flattening, objectifying, and constraining Black agro-ecological expertise and social life, anti-Blackness situated Black labor as a supposedly endless geochemical resource upon which to draw, animating dynamics of extraction and exchangeability within racial capitalist political ecologies.

We trace the processes of the chemicalization of cotton through fertilizers and pesticides to emphasize the ways anti-Blackness functions both as a labor regime and a system of calculations based upon notions of presumptively fungible labor and life.[24] The industrialization of cotton, though dependent upon Black labor, devalued Black

16. McKittrick, "Plantation Futures," 8; see also Tsing, "Unruly Edges."
17. Woods, *Development Arrested*; and Roane, "Plotting the Black Commons."
18. King, *Black Shoals.*
19. Hartman, *Scenes of Subjection.*
20. King, *Black Shoals.*
21. Rosenthal, *Accounting for Slavery*, 121–56.
22. Rosenthal, *Accounting for Slavery*, 139.
23. Johnson, *River of Dark Dreams*, 154.
24. Yusoff, *Billion Black Anthropocenes.*

lives through an exploitative investment in industrialization-as-domination. Such agrochemical development diverted value away from Black workers, farmers, and communities, while rendering chemicals and people as potentially interchangeable, however destructive the consequences. The chemicalization of cotton therefore represented a reconfiguration of extractive violence, bringing together mines and plantations through industrial processes and agrochemical reactions.

Feeding Cotton

For enslaving planters in the antebellum US South, the use of fertilizers to augment cotton-leached soils was inextricably linked to chattel slavery. These interconnections are seen clearly in the work and life of Edmund Ruffin. Ruffin was a rabidly proslavery secessionist who, according to legend, fired the first shots of the Civil War. He was also devoted to the cause of soil fertility and agricultural improvement and is often credited as the progenitor of US soil science.[25] Ruffin's devotion to soil "improvement" was conjoined with his devotion to and investment in slavery.[26] Ruffin's chemical conception of soil regeneration was founded on violence and theft, and expanded extractive imaginations in the name of the reproduction of white supremacy. His enslaving model of chemical soil improvement imagined Black labor and life as an infinite and exchangeable fountain of value and wealth, put into a relationship of equivalence with soil fertility.

In his widely influential *Essay on Calcareous Manures*, Ruffin suggested that because plantation agriculture without care to soil fertility quickly depleted once-rich lands, plantation owners were only able to persist because they paid no wages to enslaved workers and could subsidize their profits through the westward sale of the human beings they held as property. Though he presented slavery as a virtuous system, Ruffin also characterized nutrient-greedy agriculture as an unsustainable withdrawal of capital from the soil, and he wrote that the enslaved were all but "eaten" by enslavers, "or at least exchanged for [their] value in food."[27] These acknowledgments, however, did not represent a condemnation of the unspeakable barbarism of a system that killed and metabolized enslaved workers into agricultural commodities and parasitized Black women's and communities' work of biological and social reproduction for the sake of profit and production.[28] Instead, Ruffin and his acolytes envisioned a deepening of exploitation in service of soil remediation, enabling continued cotton production and, with it, the profits and power of plantation owners.

Ruffin advocated the use of marl (sedimentary rock containing lime) to restore soil fertility. His notes on a marling operation reveal the way that plantation conceptions of sustainability are dependent upon the mining of value from people and the earth,

25. Kirby, *Nature's Management*.
26. Van Sant, "'Long-Time Requirements.'"
27. Ruffin, *Essay on Calcareous Manures*, 199; Ruffin, "Southern Agricultural Exhaustion."
28. Brown, "Eating the Dead"; Morgan, *Laboring Women.*

and the racial capitalist subversion of social good for the sake of power and profit.[29] In his *Essay on Calcerous Manures*, Ruffin argued that marl mining could profitably consume the "surplus" time or "surplus force" of enslaved workers that might be "wasted" because it was not already devoted to plantation tasks. "Wasted" time, in the language of enslavers, was the time of life, leisure, love, and enjoyment—time that had not yet been entirely claimed by plantation operations. With this presupposition, Ruffin suggested that the cost of labor for marling would be no more than the "cost of maintenance," calculating the "cost of any labor" using the cost of food that would be necessary to metabolize in order to complete the mining operation.[30] Such fertilizer calculations figured enslaved people as interchangeable biological and energetic units.

In Ruffin's calculations, the working lives and realities of enslaved people appear through violent abstractions: "food—19½ bushels of Indian corn, at 45 cents"; "time lost—Sundays and usual holidays, Bad weather and half holidays, and sickness, suppose"; "7803 bushels, carried to the average distance of 1436 yards, from pit to field."[31] He listed tedious, dangerous work alongside things like food in the pages, tabulating the labor of enslaved workers as an economic cost calculated in terms of the bare necessities of life, even as enslaved people constituted the most valuable asset owned by enslavers and performed all the meaningful work on plantations. Although Ruffin's ideas depersonalized and devalued enslaved people, they represented the indispensable value in his calculations.

Ruffin was widely read and emulated by enslavers and proslavery chemists working to deepen and expand a chemical conception of vegetative life that would provide for new calculations relating human beings to cotton and chemicals. In the words of Thomas J. Summer, a Liebig-trained member of one of South Carolina's elite enslaving families, cotton could "give the blood to reinvigorate our national prosperity" through fertilizer-driven productivity boosts.[32] Alongside chemical and mineralogical conceptions of soil fertility and soil experimentations, these analyses of plants provided for an early chemicalization of slavery. These ideas rendered the productive value of enslaved people as comparable to the productivity-boosting fertilizing qualities of soils and minerals. This provided for a chemical framework of life and fertility that could deepen and extend calculations of productivity and avenues for exploitation. Plantation-boosting chemists lamented anything not amalgamated to plantation profitability as waste. With the intention of resolving the crises of cotton to assure the continuation of slavery, plantocracy, and national wealth, their practices laid the groundwork for the chemical expansion of cotton. Such attempts to deepen and extend and subvert life to cotton were developed within the context of a hostility to Black autonomy and

29. Woods, *Development Arrested*, 48–49.
30. Ruffin, *Essay on Calcareous Manures,* 333, 335.
31. Ruffin, *Essay on Calcareous Manures,* 319–20, 325.
32. Summer, *Analysis of the Cotton Plant*, 4.

Black life. John Brown, who escaped enslavement in Georgia, recounted how enslavers attempted to enhance the profitability and reach of slavery by manipulating both work and life around the cotton plant. He remembered enslavers attempting to serve repurposed and toxic cottonseeds as food:

> The seed is used to make oil from, and also oil-cake, on which sheep and horned cattle will do very well; but it is ruination to hogs. Sometimes, too, the seed is crushed and mixed up in the "mush" that is given to the negroes; but it is unwholesome, and soon brings them out in sores. I have been made to eat it, thus mixed, in my food, until I broke out in great ulcers, from my ankle-bone upwards.[33]

According to Brown, planters conducted experiments to ascertain just how much of this toxic mush enslaved individuals could tolerate, but "it was found that a very little soon sent him a long way out of the reach of his master for ever."[34] Brown's word choice is evocative, suggesting that the primary concern planters had with poisoning the people they enslaved was motivated by a fear of the loss of power and assets, rather than concerns for their well-being. Cotton—or, more accurately, the racist political ecology of cotton—was systematically toxic even before the advent of widespread synthetic fertilizers and pesticides made *Gossypium hirsutum* one of the most chemically dependent crops in the twentieth century. As Liboiron, Tironi, and Calvillo insist, toxins are determined by the ways that regimes of power enable and constrain relations and life, rather than simply the inherent properties of molecules and compounds.[35] With cotton, anti-Blackness sanctioned a systematic hostility to life that encoded environmental violence in plantation landscapes from the seed to the root.[36]

Eating the Earth

In 1842, South Carolina governor James Hammond commissioned Edmund Ruffin to survey the geological resources of South Carolina to find resources that could return fertility to the soil and maintain slavery's profitability.[37] Ruffin's survey exemplified a preoccupation with the relationship between geology and the reproduction of plantation slavery.[38] He hardly noticed, however, the vast phosphate beds under Charleston that would become central to postabolition attempts to restore plantation ecologies through extractive industry. In the meantime, wealthy planters could rely on nutritive wealth from overseas. In the mid-nineteenth century, the US fertilizer industry fastened the violence of the colonial plantation system to an emerging chemical and commercial infrastructure for global imperialism.

33. Brown, *Slave Life in Georgia*, 177
34. Brown, *Slave Life in Georgia*, 177.
35. Liboiron, Tironi, and Calvillo. "Toxic Politics."
36. Wright, "As Above, So Below."
37. Mancini, *Ones Dies, Get Another*.
38. Van Sant, "'Long-Time Requirements.'"

Guano, a nutrient-rich dust formed by the accumulation of seabird feces, became crucial to the augmentation of phosphate and nitrogen in monoculturally exhausted soils. The laborious application of guano to worn-out plantation lands became a central piece of the maintenance of the system of plantation slavery in the decades prior to abolition in the United States. The 1856 Guano Islands Act enabled white male citizens to take possession of "unclaimed" islands containing deposits of guano, and empowered the military to reinforce these claims.[39] In response to the abolition of the slave trade, the emerging guano industry was founded on new mechanisms of racial indenture, entangling distinct histories of environmental violence in the flows of nutrients and commodities.[40] The guano industry was sustained by new forms of racial coercion, including debt peonage, convict labor, and a traffic in Chinese workers bound to coercive contracts. In Zallen's words, "Guano work was not so much deracialized as reracialized."[41]

Brutal labor consumed the bodies and lives of workers and drew people into close proximity with toxins. Clouds of guano dust full of ammonia and nitrates enveloped indentured workers, leading to nosebleeds, blindness, and lung damage.[42] These new transnational geographies of extraction and accumulation consisted of toxic contact zones of cotton, guano, and racial division of labor.[43] Guano enriched merchants in ports like Baltimore and contributed to the birth of a US chemicals industry on the eastern seaboard. Before and after the abolition of slavery, this industry continued to look abroad, southward, and westward for raw materials, markets, and profits.[44]

Black freedom represented a paroxysmal crisis for a system built upon whiteness-as-property. Cotton's toxic reign and the institution of chattel slavery were neither inevitable nor untouchable.[45] US slaveowners shuddered at revolution in Haiti (1791–1804), which heralded globally the fragility of slavery.[46] This uprising fortified visions of abolition and Black liberation throughout the US South, informing a series of uprisings, including revolutionary plots in Louisiana in 1795 and 1811, the 1822 rebellion of Denmark Vesey in South Carolina, and many more acts of resistance from the spectacular to the quotidian.[47] Throughout the Americas, Black people who escaped slavery built political ecologies of freedom that eroded the monocultural ambitions of enslavers.[48] In the United States, the specter of Black freedom lurked throughout planters' discussions of fertilizers and other agricultural technologies. To planter-enslavers, Black liberation represented a loss of property and a seemingly endless pool of labor and energy upon which their lives of

39. Cushman, *Guano*; Immerwahr, *How to Hide Empire.*
40. Goffe, "'Guano in Their Destiny'"; Melillo, "First Green Revolution."
41. Zallen, *American Lucifers*, 184.
42. Goffe, "'Guano in Their Destiny,'" 34–35; Zallen, *American Lucifers*, 182–84.
43. Cadava, "Guano of History," 158.
44. Skaggs, *Great Guano Rush*.
45. Harris, "Whiteness as Property."
46. Williams, *Capitalism and Slavery*.
47. Robinson, *Black Marxism*.
48. Bledsoe, "Marronage"; Woods, *Development Arrested*; Wright, "Morphology of Marronage."

indolence depended, and a negation of naturalistic claims of slavery as proof positive of white supremacy.

When the long work of freedom came to a head with the Civil War, plantation owners turned to technologies of extraction developed under slavery. The emerging chemicalization of cotton and soil fertility constituted part of an agrotechnological framework to restitute plantation profitability and planter power following abolition. As Black southerners and their allies worked to build what Du Bois terms "abolition democracy," former enslavers' extractive conceptions of the relationship between land, chemicals, and labor complemented the cruder immediacy of white terror.[49]

In the years following abolition, racial capitalists set sights on the Ashley River phosphate beds in and around Charleston, South Carolina.[50] From the perspective of former enslavers, emancipation represented a financial, political, and logistical crisis. To some, the crisis of soil degradation and the crisis of Black freedom could both be solved through the chemical fix of phosphate fertilizer manufacture. Former enslavers who still owned plantations provided the land, and chemical-industrial capitalists, from Charleston as well as from Baltimore and New England, provided the financing for these operations.[51] Chemists who once defended slavery and plantocracy from the munitions factories of the Confederate Nitre Bureau now provided the expertise for fertilizer manufacture.[52] Chief among these operations was the Charleston Mining and Manufacturing Company, formed by Dr. N. A. Pratt, a former Confederate chemist, and Dr. Francis S. Holmes, a chemist and plantation owner. Together they secured a million-dollar investment to exploit the Charleston phosphate beds. The phosphate beds represented an opportunity to reassert a racial regime built upon the white monopolization of resources and systems of labor control.[53]

Phosphate mining and manufacturing companies sold imaginaries of racialized extraction, advertising both the extractability of phosphates and the reproduction of labor arrangements positioning Blackness as raw material of and for extraction.[54] Echoing the defense of slavery as natural and ordained racial hierarchy, Francis S. Holmes asserted that God had predestined the Carolina phosphate fields to be exploited by the plantocracy after abolition: "preparing as He did, and at a time indefinitely remote, these vast stores to be brought forth for man's use when most needed."[55] N. A. Pratt declared to the "citizens of South Carolina" (presumably this was taken to exclude recently emancipated Black South Carolinians) that the phosphate beds represented "the means of your

49. Du Bois, *Black Reconstruction.*
50. McKinley, *Stinking Stones*; Shick and Doyle, "South Carolina Phosphate Boom."
51. McKinley, *Stinking Stones*.
52. Schroeder, "'We Will Support the Govt.'"
53. McKinley, *Stinking Stones*; Shick and Doyle, "South Carolina Phosphate Boom."
54. Yusoff, "Inhumanities."
55. Holmes, *Phosphate Rocks*.

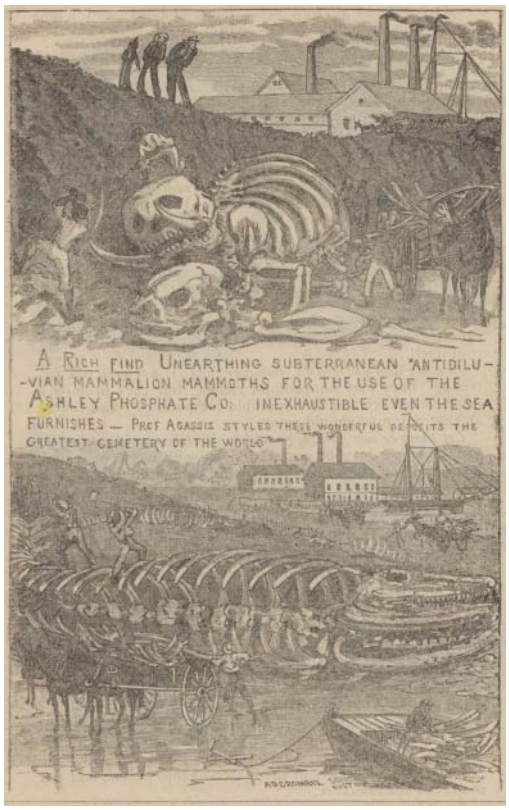

Figure 1. Ashley River Phosphate Company Almanac and Handbook, page 1. South Caroliniana Library, Phosphates in South Carolina Digital Collection.

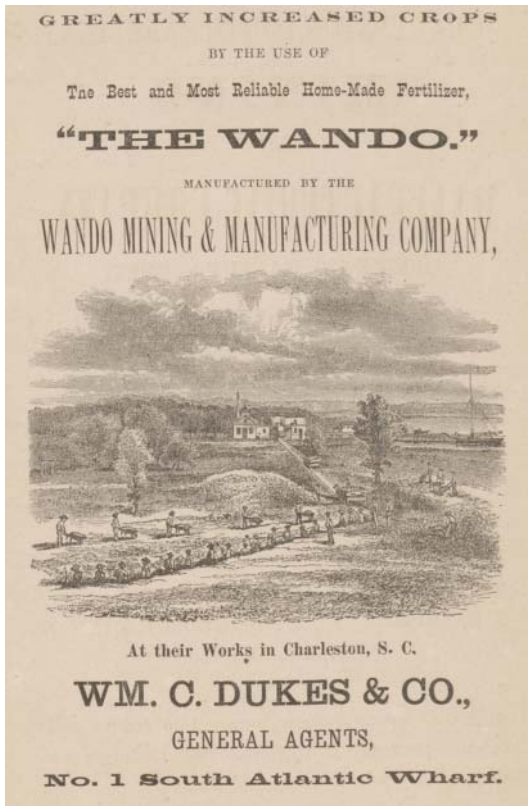

Figure 2. Wando advertisement in appendix of Holmes, *Phosphate Rocks of South Carolina and the "Great Carolina Marl Bed"* (1870).

redemption"—employing a term that was used by white southerners to designate the restoration of white supremacy after abolition.[56]

Black workers were indispensable to the success of the mining operations. Black resistance to exploitation led to an initial concession by mining companies to pay workers by the task with limited supervision, albeit under dangerous conditions and for low wages.[57] Members of the emergent plantation-mining sector, however, reiterated racialized myths of the inferiority of Black people and the particular suitability of Black workers for dangerous and tedious work to justify and attempt to order new formations of racialized extraction. The discursive and symbolic equation of Blackness with extraction can be seen clearly in phosphate company advertisements (see figs. 1 and 2). These advertisements depict both Black workers and white overseers, selling an imaginary of Black proximity to extraction and a racialized labor regime as something that could be consumed along with fertilizers. Such racial representations of labor exploitation paralleled

56. Pratt, *Ashley River Phosphates*, 42.

57. Shick and Doyle, "South Carolina Phosphate Boom," 11; McKinley, *Stinking Stones*, 74–78.

attempts throughout the South to criminalize Black freedom and autonomy in the wake of slavery, and the institution of the convict-lease system.

With the overthrow of the Reconstruction government in South Carolina, convict leasing became a central means to coerce and obtain labor in conditions approximating slavery. The mining industry helped drive this system. By 1880, the South Carolina mining industry accounted for over 80 percent of the convict leasing in the state.[58] In Florida, phosphate mining was initiated on the basis of convict labor. The emerging phosphate industry in Florida served to dramatically increase the price the state received for convict labor contracts, further entrenching convict labor as a racialized strategy for securing chemical inputs and cotton production.[59] The convict-lease system enabled and reinforced the dangerous conditions of plantation- and mining-based extraction by structurally reinforcing the expendability of Black workers. The phosphate industry, in particular, carried tremendous risk for workers. Mining phosphate was grueling and hazardous work, and the dangers of chemicals, such as sulfuric acid used in manufacture, were well-known at the time.[60] Phosphate mining also exposed workers to low levels of radioactivity through uranium in the marl.[61] Although the legal power of phosphate companies and the racist dismissal of workers' well-being contributed to archival gaps regarding the effects of industry on workers' health, more recent studies have demonstrated the presence of a range of toxic heavy metals, including cadmium and arsenic in phosphate rocks, and elevated mortality among phosphate workers.[62] The representational and material attempts to position Black workers as replaceable, expendable, and exploitable inputs had toxic consequences and shaped the ongoing legacy of pollution in South Carolina's low country and, as we emphasize, the dominance of cotton over southern landscapes and lives.

Yet the success of attempts to reassert plantation power was not a foregone conclusion. Black workers used their relative freedom to resist attempts to subvert their well-being to the mining industry and challenge the industry directly through a strike of dock workers and fertilizer workers.[63] Black communities fought to secure autonomy over their time and work, and built spaces of flourishing after the abolition of slavery. For many, mining provided supplemental wages to farming and subsistence lifestyles on redistributed plantation lands. Much to the consternation of the phosphate industry, which depended upon low-wage work in dangerous conditions, these practices enabled

58. McKinley, *Stinking Stones*, 94.

59. Mancini, *One Dies, Get Another*, 189.

60. McKinley, *Stinking Stones*, 131.

61. Shuler and Bailey, *History of the Phosphate Mining Industry*, 31.

62. McKinley, *Stinking Stones*, 145; Yiin et al., "Study Update of Mortality"; Reta et al., "Environmental Impact," 425.

63. McKinley, *Stinking Stones*; Shick and Doyle, "South Carolina Phosphate Boom," 14–15. This strike, organized in 1873, was ultimately undermined by a major economic depression, and labor organizing was further suppressed by the 1876 defeat of the Reconstruction government.

many Black southerners to exercise their freedom and mobility and resist rigid and often-hazardous labor arrangements.[64] The overthrow of Reconstruction, which decisively shifted the balance of power toward mining companies and large landowners, represented a boon to the phosphate industry. In cotton fields, fertilizers became increasingly entangled in the political ecologies of racial capitalism after abolition.

Freedom, Debt, and Fertilizers

Former enslavers in the South were consumed with two dilemmas: the freedom of the people they formerly held as property and ensuring agricultural productivity and profitability. In *The Southern Cultivator*, a journal devoted to the interests of plantation owners, lamentations of soil degradation and discussions of fertilization were intertwined with calls to reduce dependence on Black workers and to control their lives and labor. Though planters debated the ideal system of labor and the optimum fertilization regime, a presumption of and devotion to white supremacy was foundational to these discussions. As one Georgia plantation owner put it, in addition to "political supremacy," it was "necessary that the whites should have *agricultural supremacy*," to save the country from ruin.[65]

As plantation owners resisted public expenditures to secure the well-being of Black communities, planters fought against the redistribution of land and debated the best means of coercing or replacing workers. They also sought to capitalize the value of their land. Georgia plantation owner and fertilizer merchant David Dickson wrote that "we may consider that the land is the bank, lime, phosphoric acid and potash, are the specie . . . to do business on. . . . The more specie you have in the bank, the more currency you can control, and the greater the amount of deposits."[66] Dickson explicitly compared Peruvian guano with currency that could be extracted and banked on southern plantations, writing that "every man that assists in removing this guano, lying idle and useless on the Chincha islands, and puts it into circulation, creating therewith food and clothing, is a benefactor to his kind."[67] By 1870, the guano mined on the Chincha islands by indentured Chinese workers in hazardous and exploitative conditions had been nearly exhausted, and the habitat of the seabirds that had produced the guano over millennia had been destroyed.[68] Enslavers' visions of fertility, abundance, and wealth were guided and underwritten by racialized extraction and exploitation, both internationally and in southern fields.

The work of Black southerners was also indispensable to plantation profits and the maintenance of former enslavers' wealth and property after the war. David Dickson's fertilizer operation, wealth, and prominence, in fact, were established through

64. McKinley, *Stinking Stones*, 105.
65. Oliphant, "Very Important Question," 635.
66. Dickson, "Improving Our Lands," 208.
67. Dickson, "Improving Our Lands," 208.
68. Goffe, "'Guano in Their Destiny.'"

the work of the 144 people he held in slavery before the war.[69] But despite their fundamental dependence on the work of Black southerners, landowners in the *Southern Cultivator* discussed workers as interchangeable units of labor and energy, made disposable by reducing the land in cultivation and increasing productivity through fertilizers. As one Georgia planter put it, "We must use manure of all kinds, in lieu of the negro. It will not get lazy, it will not steal, it will not require feeding and clothing, nor will we have to pay taxes for it. It is all profit and no losses; for it works as faithfully when we are asleep as when watching it."[70]

The racism of such pronouncements is saturated with a hostility to and fear of Black freedom. Land monopolization, as W. E. B. Du Bois emphasized, was central to the power of plantation owners.[71] Plantation owners bitterly resisted, and ultimately defeated, Black southerners' push for the widespread redistribution of former plantation lands following abolition. They also opposed Black efforts to purchase land individually, in an attempt to maintain social and political domination.[72] Against these obstacles, however, many Black farmers were able to acquire land, especially in areas not dominated by cotton plantations. In Texas, for example, almost a third of Black farmers owned the land that they worked by 1900.[73] Emancipated southerners, moreover, resisted the efforts by plantation owners to institute labor relations reminiscent of slavery.[74]

Since whites owned the vast majority of land throughout the cotton-producing South, and Black workers resisted labor exploitation mirroring slavery, the sharecropping system first emerged as an uneasy compromise between landless farmers and landowners. Under this arrangement, landowners agreed to allow workers to farm the land for a share of their crops.[75] This system was highly unequal. White landowners used every tool at their disposal to diminish the power, freedom, and mobility of Black southerners. Throughout the South, the criminalization of Black freedom, mobility, and subsistence helped ease so-called labor shortages by foreclosing alternatives to the sharecropping system, creating a pool of convict labor, and enforcing harsh conditions of work in farm and mining operations alike.[76]

69. Johnson, "Reconstructing the Soil," 85.

70. Van Buren, "Weeds," 119.

71. Du Bois, *Black Reconstruction*.

72. Schweninger, "Vanishing Breed," 47–48.

73. Schweninger, "Vanishing Breed," 48; Mandle, *Not Slave, Not Free*, 37; Reid, *Reaping a Greater Harvest*, xxii. Because this essay is focused on development prior to the 1930s, we do not focus on the decline of Black farm ownership (which peaked between 1910 and 1920) through discrimination and theft of Black land. However, the developments we trace here established conditions that contributed to a dramatic decline of Black-owned land and Black farm ownership in the remainder of the twentieth century. For more information on the importance and decline of Black landowners in the South, and the role of discrimination by the USDA and extension service, see Daniel, *Breaking the Land*; Daniel, *Dispossession*; Petty, *Standing Their Ground*; Johnson, "Racial Orders"; Reid, *Reaping a Greater Harvest*.

74. Fite, *Cotton Fields No More*, 3.

75. Fite, *Cotton Fields No More*, 4–6.

76. Wilson, *America's Johannesburg*; Williams and Freshour, "Carceral Geographies."

The crop-lien laws also helped resuscitate plantations. These laws served to legally institute that if sharecroppers took an advance of credit or supplies from the landlord (a necessity for landless farmers with little or no capital), their crop would legally belong to the landlord. They also empowered landlords to seize sharecroppers' property or crops as repayment.[77] Such laws ensured that tenants and sharecroppers would have different legal relationships with cotton than landowners, establishing sharecropping as a sort of waged labor founded upon debt.[78] Credit, land monopolization, and legal and extralegal coercion therefore replaced slavery in this restituted plantation system after abolition.[79] Because the crop-lien system tied credit, its repayment, and any hope of profit to the production of cotton, it solidified cotton's hold over southern fields and, with it, the power of landlords, merchants, and fertilizer companies over lives.[80]

This system also converted fertilizers (and food) into debt.[81] As Tim Johnson documents, farmers purchasing fertilizers on credit (often at exorbitant rates of interest) were expected to sign "guano notes," which tied the extension of credit to the production of cotton and guaranteed fertilizer purchases through liens on farmers' crops.[82] This system potentially affected all farmers who needed lines of credit for fertilizers, but disproportionately affected Black farmers, who on average had far less capital than white farmers.[83] At the Tuskegee Institute's agricultural experiment station, George Washington Carver recognized that commercial fertilizers were a key source of debt for Black farmers and tenants. He encouraged composting and the use of organic fertilizers found on the farm, writing that that "many thousands of dollars are being spent every year here in the South for fertilizers that profit the user very little, while Nature's choicest fertilizer is going to waste."[84]

Debt fueled a cycle of fertilizer-based intensification, allowing merchants and landowners to dictate production terms as planters and smaller farmers entered relationships of debt with suppliers of credit and inputs. And for sharecroppers and tenants, these debts were passed on, with added interest, by landowners, who deducted from

77. Aiken, *Cotton Plantation South*, 24; Petty, *Standing Their Ground*, 42.

78. Aiken, *Cotton Plantation South*, 24; Reid, *Reaping a Greater Harvest*, "Introduction," 12.

79. The majority of counties dominated by plantations prior to abolition continued to be dominated by large landowners and the plantation system under sharecropping. Though plantations constituted a relatively small percentage of farms in the South (as was also the case before abolition), they controlled a significant percentage of land and dominated agriculture in a wide swathe of the region. See, for example, Aiken, *Cotton Plantation South*; Fite, *Cotton Fields No More*, 33–34; Mandle, *Not Slave, Not Free*, 5–20.

80. Fite, *Cotton Fields No More*, 10, 85.

81. For a particularly incisive account of this cycle of indebtedness, see Haywood, *Negro Liberation*, 31–35.

82. Johnson, "Reconstructing the Soil," 201; see also Petty, *Standing Their Ground*, 85.

83. Ransom and Sutch, *One Kind of Freedom*, 185.

84. Hersey, "Transformation," 67. The Tuskegee Institute (now Tuskegee University) was one of the major institutions in the US South that served Black farmers in a segregated and unequal system of agricultural research and extension.

tenants' crops. Because of these pressures, many tenants had no choice but to purchase fertilizers on credit.[85] Commercial fertilizers were only temporary fixes to declining soil fertility on lands depleted by crop after crop of cotton. Although plantation owners and white agricultural officials frequently decried the supposed inability of Black workers to care for the land in racist terms, it was the plantocracy's embrace of agrarian exploitation, and its resistance to Black freedom, that drove the extractive machinery of debt and soil degradation.[86]

By 1910, over 70 percent of commercial fertilizers used in the United States were used in the US South.[87] As the chemicals extracted from guano islands and phosphate fields helped sustain this exploitative system, the growing fertilizer industry benefited from indebted lives in southern cotton fields. Fertilizers, debt, and coercion formed the interlocking elements of a system based upon racism as an ordering principle of economic and ecological extraction—and one that was distinctly vulnerable to insect predation.

Other Poisons

Cotton was distinctly vulnerable to insects prior to the arrival of the boll weevil. Before abolition, plantation owners relied on enslaved workers to personally remove worms from cotton plants by hand, but soon after the Civil War, some planters turned to pesticides as a chemical fix to the vulnerability of plantation ecologies.[88] By the 1870s, when plantation owners began to use arsenical insecticides against cotton insects, the systemic toxicities of white supremacy were extended through poisonous compounds, with deleterious effects on workers' health. An 1879 report from the United States Department of Agriculture insisted on the harmlessness of arsenical insecticides on the very same page it reported that "it is no uncommon thing to hear of partial poisoning among negroes, resulting from that indifference which comes from constant use."[89] This rendering of toxic exposures as inconsequential, enabled by a racist disregard for workers' well-being, would characterize the chemical intensification of cotton.

Black tenants were usually the workers on plantations who applied arsenical chemicals manually and, as Giesen points out, were required to pay for the poison.[90] Racial capitalism, as a system that reproduces power and profits through an uneven valuing of human lives, served to maintain the conditions for pesticide intensification. Not only

85. Petty, *Standing Their Ground*, 85; Ransom and Sutch, *One Kind of Freedom*, 187–88.

86. For the role of racist presumptions about Black farmers' abilities in shaping the design of agricultural research and extension in the United States, see Harris, "'Extension Service Is Not an Integration Agency.'"

87. National Planning Association, *Fertilizers*, 14. In 1927, almost a third of all fertilizers used in the United States were used on cotton. Corn, often also grown on cotton plantations to feed mules and livestock, accounted for another 22.5 percent of national fertilizer consumption (15).

88. United States Entomological Commission, *Fourth Report*, 5.

89. United States and Comstock, *Report upon Cotton Insects*, 138.

90. Giesen, *Boll Weevil Blues*, 89–90.

were Black workers usually the people who came into immediate contact with white arsenic and calcium arsenate, but economic coercion and racial violence contributed to a system by which Black lives were devalued, and bore the financial and human costs of applying a toxic substance by hand. Calculations of the profitability of poisoning did not take the health of workers into consideration. Rather, experiment station researchers compared the cost of insecticides and the cost of labor against the possible profit from increased cotton yields, while attempting to minimize the toxicity of calcium arsenate applied to cotton.[91] One researcher in Alabama, for example, urged plantation owners to apply calcium arsenate because the labor to apply it "costs practically nothing" since Black tenants who planted the crop would be applying it.[92] Cotton boll weevils spread rapidly throughout the South in the early 1900s because the expansion of monocultural cotton provided an ideal environment for them to flourish.[93] This singular production of cotton was subtended by aforementioned racialized labor exploitation, debt, and the chemical fix of phosphates and guano. The result: a buffet for pests. The vulnerability of monocultural agriculture provided an opportunity for the chemical industry. Calcium arsenate, fabricated from industrial surpluses and toxic to humans and weevils alike, was adopted widely in plantation regions like the Mississippi Delta. It represented an alternative to abandoning the crisis prone and destructive political ecologies of cotton, and an opportunity for enhanced profits on the part of chemical companies and input suppliers.

The use of calcium arsenate against the boll weevil quickly became important to the global chemical industry. In years of high weevil infestation and high cotton prices, the market price of arsenic rose dramatically, only to sink during years of low cotton prices and when the weevil was relatively dormant.[94] Between 1919 and 1929, the volume of insecticides used in the United States roughly quadrupled, and calcium arsenate represented the majority of this increase.[95] In addition to USDA officials and chemical manufacturers, farmers soon became dependent upon pesticides. In 1920, Charles A. Whittle of the Southern Fertilizer Association wrote that "a crop so prominent and so vital to the South as cotton is of great concern to the fertilizer manufacturer. He will want to encourage the use of calcium arsenate to the extent of its ability to protect the farmers' cotton in an economical way."[96]

The aerial application of pesticides on fields by airplane, now a global practice, had its origins in the Mississippi and Louisiana Delta in the 1920s.[97] Airplanes changed the scale of pesticide application, as hundreds of acres of cotton could be covered with

91. See, for example, Coad, *Recent Experimental Work*.
92. Mims, *Boll Weevil Control*, 10.
93. Giesen, *Boll Weevil Blues*; Quaintance and Brues, *Cotton Bollworm*, 30.
94. Haynes, *Chemical Economics*, 57–58.
95. Davis, *Banned*, 11.
96. Whittle, "Calcium Arsenate," 56.
97. Downs and Lemmer, "Origins of Aerial Crop Dusting," 125–26.

calcium arsenate in a single flight. This represented a shift in the chemical regime of plantation production. Rather than workers spreading calcium arsenate by hand or using mule-drawn carts, airplanes spread calcium arsenate over fields, cabins, and people below.[98] According to early pesticide researchers, plantation regions such as the Delta were particularly auspicious for crop dusting because of their flatness and consolidated ownership of land.[99] Researchers working on crop dusting appear to have been concerned about tenant cabins in the fields only as obstacles to the flight paths of crop dusters.[100] They dismissed the risk of tenants being exposed, writing, "It is true that cabins frequently were subjected to a cloud of dust, but this is equally true in the case of ground machines, and the latter have been used for several years without any apparent damage or danger."[101] The report—as with other calcium arsenate research—provides no indication that there was any meaningful attention to "damage or danger."

Legal disenfranchisement, threats of violence, and a regime prioritizing agrarian productivity over human lives formed the basis and context for the pesticide intensification of cotton plantations in the US South. By the mid-twentieth century, the Delta region led the United States in both pesticide use and cotton production, with a whole range of chemicals, many of which are now banned, taking the place of calcium arsenate.[102] Chemical companies, creditors, textile companies, and many others found profit in poisons. Delta Airlines, for example, with billions in annual revenue, had its start as the world's first commercial crop-dusting company, covering the plantation lands of Mississippi and Louisiana with calcium arsenate and exposing the workers below.[103]

Conclusion

The chemicalization of cotton did not simply replace the institution of slavery. Rendered toxic by its imbrication in the structures of racial capitalist harm and profit that determined its dominance, cotton was made even more toxic by attempts to maintain its viability. The application of fertilizers and pesticides to cotton fields represented a form of extractive environmental racism that was animated and sustained by toxicities both metaphorical and literal. From guano and phosphates to arsenicals, anti-Black racism in the United States South powerfully shaped early notions and practices of chemicalization. Chemists and planters imagined Black labor as an interchangeable and accessible geochemical resource, often tabulated alongside and represented as

98. Anderson, *Low and Slow*, 11–14.

99. Coad, Johnson, and McNeil, *Dusting Cotton from Airplanes*, 35.

100. Coad, Johnson, and McNeil, *Dusting Cotton from Airplanes*, 24.

101. Coad, Johnson, and McNeil, *Dusting Cotton from Airplanes*, 37.

102. For the Delta's centrality in mid-twentieth-century US pesticide usage, see Williams, "'That We May Live'"; for the shifting regional dynamics of pesticides in the twentieth century, see Musoke and Olmstead, "Rise of the Cotton Industry," and Saffell, "When Did King Cotton Move His Throne?" Although cotton production increased significantly in arid regions of California and Texas in the twentieth century, these regions were not nearly as vulnerable to insect predation as the humid, already established cotton fields of the South.

103. Hoogerwerf, *Roots*; Giesen, *Boll Weevil Blues*.

equivalent to the raw materials of extraction. Though planters and industrialists pursued and promoted agrochemicals as technological advancements, behind those ideologies of agrarian progress, fertilizers and insecticides were embedded in a material and representational culture that maintained and expanded racist divisions of labor both domestically and internationally.

The trajectory of cotton chemicalization shows that racism does not merely complement the dynamics of environmental extraction. Rather, racism saturated the environmental and technological conceptions that shaped the development of plantation agriculture and systemically oriented agrarian development toward extraction, environmental dispossession, and toxicity. Environmental racism, that is to say, is not ancillary to capitalism but a central feature—animating ideas of value, waste, and technological progress. Racism simultaneously values and devalues people, land, and ecologies, while generating and channeling toxicity. In this sense, the chemicalization of cotton plantations was both extractive and productive, providing a laboratory for the parasitic manipulation of ecologies, lives, and laboring processes in search of value. Technologies developed on cotton plantations proliferated industrial capacities for toxicity and environmental destruction, while underpinning geographies of white wealth and belonging. These extractive practices and technologies putatively discarded their racist roots in the twentieth century, but they linger and transform, threatening lives in their toxic travels.

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