# Mattering Toxics and Making Toxics Matter in Architecture and Landscape Histories

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PROJECT
Toxics

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> We are in a new chemical regime of living in which not just genomes but the atmosphere, water, soil, nourishment, commodities and our very bodies are apprehendable as caught in possibly toxic molecular relations.
>
> —M. Murphy

Toxic. Toxics. Toxins. Toxicants. Toxicity. These terms slip in and out of architecture, design, and urban planning discussions, shifting between scientific, medical, legal, and cultural meanings. Toxic—*toxicus*, of the nature of a poison; poisonous—describes bad cellular relations between bodies and substances; substances that are poisonous and cause harm to living cells.[1] But what does the history of toxics reveal about the history of architecture, and vice versa?

Buildings carry toxics. From nineteenth-century arsenic-laden wallpaper to present-day chemical sensitivity–inducing formaldehyde-laced plywood sheets, increasingly industrialized building practices have created new products and modes of consumption, production, regulation, and disposal.[2] Over the last one hundred years, building materials have become increasingly composite—made by cutting, mixing, extrusion, cross-lamination, and even nanomaterial microscopic manipulation. These processes introduce toxic substances into architectural spaces. How do scholars narrate histories of dangerous materials that so often evade our consciousness, governance, and control?

How do we understand architecture's corporeal, environmental, and social agencies under these evolving material conditions? How do historians account for the methodological and practical challenges of writing about untraceable substances, mapping inaccessible supply chains, or navigating legal restrictions on archives of material? Writing histories of toxics offers an opportunity to understand how the differences between nature and artifice, production and consumption, business-as-usual and environmental justice, and the toxic and nontoxic are produced and perpetuated.[3]

We began this project in December 2020 with an open call for contributions. To gather views on a range of toxics, we sought collaborators whose work demonstrates what architectural history can offer to an already robust body of research on toxics in environmental history; science, society, and technology studies; the history of science; anthropology, Black, and critical geography; and cultural studies. After reviewing anonymized submissions, we selected proposals that would accommodate our need to keep this group small enough for meaningful workshops and transparent peer review and that would provide complementary topics and research methods. Starting in spring 2021, we undertook a year of collective workshops and editing sessions. We chose to release this project in three phases to accommodate different writing schedules and immune systems during the ongoing COVID-19 pandemic. We are publishing the introduction with the first group of papers, but we will add to it with each new release, color-coding new additions to guide readers quickly to new sections. Additionally, we will publish an interdisciplinary bibliography to support future work at the intersection of toxics and architectural and landscape history.[4]

## Toxics Methods and Methodologies

Writing architectural histories of toxics requires methods and narrative strategies that animate matter. The essays published here test the methodological limitations of formal analysis by reading architectural and landscape history to explore the physical, material, and bodily processes generated within toxic relations. They engage methods and discourses that are not yet standard in architectural and art historical training. As art historian Fernando Domínguez Rubio has argued, opening historiography to natural processes requires an "ecological approach." Accounting for ecological processes—decay, humidity, degradation, material

composition—sets material histories in relation to political and aesthetic ones. Domínguez Rubio's turn from objects to processes foregrounds ecological relations—from the microcellular to the macro landscape—thus helping architectural historians to read between bodies, substances in buildings, and physical systems over time.[5] Authors writing texts for this project traverse the worlds of science, legal studies, social geography, and activism, reading toxicological analyses, material product laws, worker protection statutes, labor protections, atmospheric emissions modeling, environmental injustice testimonies, and oral histories.

Narrating histories of toxics impels historians to think about the structures of land and bodies as well as buildings and to understand insights from disciplines and communities that have longer engagements with narrating toxic histories. In 1966, cultural theorist Mary Douglas's groundbreaking *Purity and Danger* helped to build engagement with toxics within existing fields—the social sciences, public health, the history of science and medicine—as well as to provide a conceptual foundation for new ones: discard studies, ecocriticism, waste studies, and pollution studies.[6] Ensuing work traced material, toxicological, chemical, molecular, human, and nonhuman presents and histories bound in toxics. This scholarship helped to clarify that toxicities are also social; as Vanessa Agard-Jones, M. Murphy, Katherine McKittrick, and Max Liboiron show, physical toxics are often accompanied by pervasive emotional, relational, corporate, and governmental toxicities.[7] Historians of the environment and sciences have helped us understand when and why material toxicities are permitted and the damage they have done. Developing architectural historiographies and methodologies of toxics requires listening to, learning from, and honoring work from other disciplines.

As crucial as it is to diagnose harm, toxics studies and methods often "stay with the harm" in a way that can prolong it; as Eve Tuck clarifies, "the danger in damage-centered research is that it is a pathologizing approach in which the oppression singularly defines a community."[8] Thinking with damage begets more damage, framing whole communities as "broken" and repeating dispossession and disenfranchisement.[9] We follow anthropologists Nicholas Shapiro and Eben Kirksey as they nudge us to a toxic methodology that is not detached from or repeating structures of harm and burdens. Instead, they encourage methods that are "unworlding," "lived," and engaged in contemporary issues of toxic legacy.[10]

Centering community expertise is also crucial; environmental justice (EJ) and Indigenous rights movements have long clarified that community expertise matters in toxics. When researchers from outside impacted communities highlight damage, expose structural injustice, or demand redress, scholars receive recognition, but EJ communities often don't benefit. Both Tuck and environmental justice leaders such as Elizabeth Yeampierre therefore encourage scholars to do research when invited to do so and to center and support community-based research; these are tenets of the environmental justice movement and embedded in its Jemez Principles.[11] Since architecture and urban planning have been part of toxic harm, architectural historians engaging in toxics research must be careful not to parachute into harmed communities and/or perpetuate harm narratives. A generation of urban planners who have worked in concert with environmental justice communities have developed practices of reparative research.[12] Impacted communities imagine futures and set terms for reparations, which architectural scholars and students can support.[13] If overcoming toxic harm is a goal, we seek to move beyond toxic injury in "individualized, molecularized, damage-centered, and body-centered frames" to methods of hope and detoxified futures.[14]

With these insights in mind, collaborators to the Toxics project in *Aggregate* build upon work in toxics studies to understand how art, architecture, and landscape histories—and historians—can advance this conversation. Our authors examine late-industrial landscapes, complex chemical alliances, uneven disease risks, corporate influence, colonial networks, transnational land disputes, material effects, ruined landscapes, combustion aftermaths, and production violence. They move from factory dust to plantation photography in the United States, England, South Africa, Costa Rica, and beyond.

Essays in this collection follow three thematic groupings. The first theme, "Materials: From Pipes to Pipelines," describes the material and matters of toxics in art, architecture, and landscape histories, from early-modern examples to recent developments in toxic building materials. The second thematic group, "Grounds: Lands and Legacies," uses toxics in the land as an analytic lens through which we can see and thereby understand how property regimes, colonial relations, and mislaid regulations foreground systematic toxic legacies, as a 1960s understanding of toxics as "matter out of place" shifts to understanding waste and toxic matter as a reflection of power.[15] The third theme, "Life: From Bodies to the Embodied," examines how toxics

come to matter within human and nonhuman bodies by exploring how built spaces contribute to discussions about the maintenance of threatened lifeforms.

## Materials: From Pipes to Pipelines

From liquids saturating dye workers' skin and the ever-present dust in open-cast mines to plastic products pushed from factory molds and lead paint chips layered on domestic siding, making toxics matter, or mattering toxics in art, architecture, and landscape histories, requires exposing physical materialities in buildings, objects, and landscapes. It also requires attending to associated toxic effects, surfacing a deeper understanding of material legacies, environmental interactions, and uneven body burdens.

Scientific, industrial, and embodied knowledges form our understandings of toxics. At the turn of the twentieth century, committees of scientists established to investigate industrial hygiene and public health (a field later known as toxicology) defined dilution theories, threshold values, and toxicity limits for human bodies, air, water, and soil. These limits delineated risk in terms of capacity, the assumption being that natural systems tolerated specific harmful quantities; there was thus no consideration as to whether toxic substances should be allowed at all.[16] Scientific limits often miss durational, systematic, and interlinked effects, as chemical residues, endocrine disruptors, and biological accumulation present exposures that must be measured in decades and centuries.[17] Max Liboiron's recent work on the distinction between "toxins"—harmful substances organically produced—and "toxicants"—substances industrially manufactured at increasing speeds in seemingly unlimited amounts—helps us distinguish newly developed dangerous materials from naturally occurring harmful substances.[18] In quantity, these toxicants make up brownfields, Superfund sites, postindustrial landscapes, and wastelands, yet scientific acceptance of these substances has helped them evade regulation. As Murphy and others have argued, their varied presence in our environment forms part of these substances' biopolitical history.[19] These materials become media through which scholars and users stage debates about health and exposure.

Scholars have built new vocabularies to describe the unique effects created in the afterlives and preconditions of toxics; residues, colonial assemblages, chemical bonds, chemical kin, tiny hazards, and slow violence reinscribe how toxics build material relations. As the collaborative group Soraya

Boudia, Angela N. H. Creager, Scott Frickel, Emmanuel Henry, Nathalie Jas, Carsten Reinhardt, and Jody A. Roberts argue, residues offer a way to think beyond the material to the left-behind conditions—the "irreversible," "material," "slippery," and "unruly," as well as those that "create work" to unsee harm.[20] Gabrielle Hecht offers that toxic residues beget the afterthought of "residual governance," or uneven governance that addresses certain "people as residual" in the "afterlife of extraction."[21] Murphy describes the microscopic "tiny toxic hazards" that accumulated in postwar American offices from the materials in their "unremarkable interiors." These hazards, combined in the office environment, made people sick; indoor pollution created a new toxic condition called "sick building syndrome."[22] Yet, these conditions were rendered less harmful (or were not even present) in the "domains of imperceptibility."[23] For Murphy, material toxicity is an active process of "un-knowing" harm. The emerging literature on microscopic and molecular toxics—sprays, drifts, wafts, vapors, and slicks—allows us to see and name these diffuse material forms.[24]

Architectural histories are increasingly being written through the lens of materials: concrete, wood, and plastics have all been the focus of recent studies.[25] Drawing on this disciplinary knowledge, as well as expertise in history, industrial hygiene, toxicology, regulatory and policy history, environmental studies, and the social sciences, architectural historians locate toxics in everyday interiors and landscapes and show how they have arrived in and been normalized in these spaces. Research on well-known toxics such as arsenic (e.g., in "woozy rooms," where wallpapers containing arsenic-infused dyes caused inhabitants to faint in the Victorian era), asbestos, and lead can be a guide.[26] Asbestos's history is well known, and the banning of its use is viewed as a success in the United States, but as Rachel Maines, Jessica van Horssen, and Hannah le Roux show, asbestos remains a persistent global problem, in Canada, South Africa, and beyond.[27] In the case of lead, found in pipes as well as paint, the uneven politics in material realities come to the fore. Describing lead exposures in Flint, Michigan, Catherine Fennell explains that US policies toward lead that individualize responsibility for contamination mean that "there is no 'we' here; there are only individual homeowners and landlords who act more and less responsibly when grappling with the residues of bygone building practices."[28] But as Christopher Warren and Leif Fredrickson show, lead becomes us. With the toxic metal's pervasiveness and inadequate regulation, the soft substance is now part of our

social and cultural selves.[29] As much as is known of these materials, thousands of modern industrial compounds produce a litany of suspect effects.

Given that toxics are everywhere in industrial buildings, and given the long legacies of harm, how do researchers not only detect them but also theorize their persistence? Some scholars have turned to "new materialism" to theorize the agency of compounds and objects.[30] In architecture, however, much of the work invoking new materialisms has been put in the service of explaining and legitimizing design experiments rather than environmental effects. Material agencies can still be productively explored, but the claims that new materialism is valuable because it goes "beyond the human" do not acknowledge the racialized constructions of the categories of human and nonhuman, as Zakiyyah Iman Jackson and Kyla Wazana Tompkins have argued.[31] We also underscore Zoe Todd's assertion that European and US settler theorists have erased and ignored Indigenous knowledges with their belated realizations that plants, minerals, and even toxics have agencies.[32]

We look to studies of matter that remain centered within decolonial thought. As Max Liboiron has explained, "pollution was (and still is) about naming a deviation from the good and true path of things—good relations manifested in the material."[33] Liboiron's theorization of "good relations"—from a social concept of relationality that might also be applied to material relations—shows how colonial relationships born in conjunction with the advent of modern chemistry correlated with rampant toxicological harm. Liboiron and their collaborators' techniques of repair for this material harm amount to having good relations in research —collaborative practices and citation methods that create community against and through the persistence of toxics.[34]

## Grounds: Lands and Legacies

How do landscape histories open up when land is understood to be tied to toxic social and material legacies? Historians, theorists, social scientists, and activists offer ways to rename and, by extension, reclaim landscapes aligned with toxic conditions. As Max Liboiron argues, "pollution is colonialism": uneven burdens of pollution, waste, and dispossession are too often imposed on Indigenous people and land.[35] At the same time, such pollution burdens necessitate the development of deep methods to narrate and interpret the connections between Land and toxicants. Scholarship on the impacts of pollution in Indigenous

communities by Traci Brynne Voyles, Katsi Cook, Stuart Harris and Barbara Harper, Teresa Montoya, Kyle Powys Whyte, and many others underscores how decolonization is entangled with toxic legacies.[36] Scholars working in other geographies explore parallel histories of lands marked as toxic: Vittoria Di Palma shows how early-modern English landscape paintings categorized land by depicting it as a non-compliant and contaminated "wasteland." Vanessa Agard-Jones narrates historical connections from the contaminated lands of Martinique to contemporary compounds in Kepone (chlordecone) chemicals.[37] Jane Hutton shows how steel and guano create reciprocal relations in landscapes in the Americas.[38] Rob Nixon's "slow violence" names decades-long and often unseen environmental harm to impoverished people and sacrificial places.[39] These texts remake discussions of toxics, providing sharp vocabularies to describe landscape as anything but neutral.

Environmental justice scholarship and colonial studies have guided the thinking in this collection of essays by demonstrating how racism and colonial legacies structure landscapes. Robert Bullard developed a new frame for seeing the violence of uneven environmental burdens by describing how the "anatomy of environmental racism" is built into North American cities, and Sylvia Hood Washington illustrated, in a pathbreaking study, how structural racism influenced Chicago's planning practices, and how even at the turn of the twentieth century, communities of color and working-class communities explicitly organized against environmental injustice.[40] Steve Lerner's engagement with "sacrifice zones" and Dorceta Taylor's work on "toxic communities" document the injustice of concentrated industrial dumping and emissions.[41] In addition, as Samia Henni's work on desert landscapes and emerging research on the architectures of nuclear waste sites shows, toxicities perpetuate and prolong colonial occupation.[42]

Landscape provides the ground where structural harms are left in soil and transferred to bodies through buildings constructed on that soil. For example, in the late 1970s, developers established Gordon Plaza, a New Orleans subdivision. The building site had for decades been the Agriculture Street Landfill, a dumping ground used for a variety of waste material, including debris from 1965's Hurricane Betsy. Federal funding partners, city planners, developers, and architects chose this former dump as the site for Gordon Plaza, a new community for Black working-class and middle-class families. After exposure symptoms surfaced and environmental activists protested, the Environmental Protection Agency tested the site and found 140 toxic and

hazardous materials—more than 40 of them known to cause cancer—buried under homes, community centers, playgrounds, and schools. In 1994 Gordon Plaza was designated a Superfund site, and the EPA (in cooperation with regional authorities) allocated $20 million for remediation to remove contaminated soil. The current Louisiana Tumor Registry identifies the Gordon Plaza tract as having had the second-highest level of sustained cancer rates in the state between 2001 and 2015. As the residents who demand relocation funds in the face of this persistent threat contend, remediation is not enough.[43]

Landscapes encompass toxic harm beyond individual sites. Within architectural and infrastructural studies, renewed attention to labor, logistics, and supply chains uncovers how the harms of toxics register at each stage of construction. For example, members of Who Builds Your Architecture?, a research and advocacy collaborative, have insisted that architectural design encompasses the safety and liberation of people working as construction laborers; this group's work helps us see construction labor as part of an ecosystem of design.[44] In their research on supply chains and logistics, media scholar Matthew Hockenberry, anthropologist Anna Tsing, and architect Jesse LeCavalier illuminate the violence and complex distribution networks that undergird modern material procurement systems.[45] These harmful complexes include dependence on colonial exploitation and obfuscation within an unjust global commodity market.

Accurate diagnoses of toxic harm and transparency in toxic commodity supplies are helpful, but practices of landscape repair are essential. Vanessa Agard-Jones's work, for example, helps us see how agricultural pesticides are situated in plantation geographies but draws on histories of residues and resistance to narrate bodily practices of continuance. If chemical bonds create new forms of chemical kinship across the landscape and within bodies, as Sara Wylie, Angeliki Balayannis, and Emma Garnett, as well as Agard-Jones, argue, how might this help us to see toxic kinships across dispersed geographies?[46] As Jill Harrison and Linda Nash show, pesticide drift burdens workers, lands, and multiple nonhuman species, as wafts of the insecticide DDT and the herbicide Round-Up trespass physical and regulatory boundaries.[47] In rethinking processes of repair, the Munsee Three Sisters Medicinal Farm and Soul Fire Farm use organic and/or regenerative farming techniques to provide food and medicines to restore overburdened landscapes and bodies. Learning from such

practice, scholars can connect processes and methods of continuance and repair to architecture and building.

## Life: From Bodies to the Embodied

Architecture not only encloses the body; it also becomes the body. The pieces in the third group of essays in this project examine the impacts of toxic incorporation in bodies and lifeworlds. What do these materials do to bodies? How have these impacts been understood? How are they tied to histories of racialization and to their accompanying geographies? How has—and can—architecture shape our understanding of toxic bodies, both human and nonhuman? And, as we've asked in each section, how can the insights of researchers and activists who have long worked in these domains impact architectural scholarship, and vice versa?

When discussing bodies and lifeworlds impacted by toxics, understanding how to write and work across conditions of uneven risk is crucial. Methods for this come from often-overlapping activist and academic communities. Those most affected by toxic impacts such as smog, pollution, and flooding often are low-income communities of color. Asthma, for instance, has a deeply developed environmental history written by these communities but an architectural history that remains to be written. Community-based student researchers working with the New York City Environmental Justice Alliance have documented and narrated pollution levels in their communities; they help us see that asthma is both a lived affliction and a consequence of the built world that requires both modern particulates and dense forms of housing.[48] In alliance with this work, anthropologist Kim Fortun's "Asthma Files" collaborative shows how late-industrial urban life resulted in globally pervasive asthma—a medical condition with structural injustices, emotional marks, and spatial dimensions written into its becoming.[49] An architectural history of asthma could weave together this work with community testimony, histories of urban planning, and histories of environmental racism, reading them alongside HVAC building plans set alongside smog-generating highways.

Architectural studies of the bodily impact of toxics have much to draw from existing literature. M. Murphy's explicit examination of how architectural spaces modulated understandings of uneven risk in *Sick Building Syndrome and the Problem of Uncertainty* describes how toxicants in office buildings, furnishings, and interior treatments started to make workers, primarily women, sick, and how women's

complaints were dismissed because the impact of toxicants was gendered and difficult to quantify. Murphy shows that toxicants impacting women could be sensed and symptomatized but were primarily left unregulated. Nancy Langston reveals how bisphenol A—a persistent hormone disruptor used in building plastics and many consumer products—created "toxic bodies."[50] Following in this vein, Norah MacKendrick shows that the burdens of advocating against toxics in commonly used materials often fall on women's shoulders; this gendering of advocacy is a feature of neoliberal regimes that resist regulation.[51] Keeping one's body "pure" or "safe" is yet another form of work that is displaced onto (women) workers and consumers, and this mental burden adds to the uneven bodily burdens of the toxicants themselves.

Scholarship about the bodily impacts of toxics could be meaningfully enlarged by engagement with architectural history and theory. Architectural theorists have described for millennia how buildings and bodies reciprocally impact one another. Suppose Murphy's book *Sick Building Syndrome and the Problem of Uncertainty* were (re)written with disciplinary knowledge from architectural history. In that revision, we might have an account of the connections between office designers and users and of how design discourses have hidden or symptomatized understandings of risk and residue. Further, understandings of the architectural histories of the racialization of space could be meaningfully rethought in the contexts of toxics, as some of the scholars working on this topic in this project have done.[52] Thinking about buildings and landscapes with Sara Ahmed's work on spatial phenomenology, as some members of this group have been doing, can also open up new methods of writing about experience, embodiment, and positionality in toxic worlds.[53]

Finally, studies on architectural supply chains produced within architectural history and practice not only explicate landscape burdens of toxics but also expose the impacts of uneven bodily risk for consumers, producers, and manufacturers of architectural materials. Now that organizations such as the Healthy Building Network have established risk parameters through such tools as the Pharos Project Database, researchers can see where risk is magnified along the supply chain; in most cases, body burdens are highest at the beginning and end of the use chain (i.e., manufacturers, extractors, and recyclers). Drawing from authors such as Brett Sturlagson, who helps us see the complex supply chains behind common architectural materials; the Grace Farms Foundation

Architecture + Construction Working Group, which seeks to eliminate forms of modern slavery from building products; and the Health and Well-being of Waste Workers in India project at the George Institute, which examines sites of discard (and have joined us in workshops for this project), we can locate lifeworlds impacted by toxic production and discard conditions.[54]

Exposures are often pitted against other environmental needs. In April 2022, the US-based Poor People's Campaign staged a protest outside a factory manufacturing Rockwool, a commonly used insulation and sound baffling material, across the street from an elementary school in Ranson, West Virginia. They were boosting the work of two local environmental groups, the Eastern Panhandle Green Coalition and Jefferson County Vision, which have documented how, since the factory has opened, asthma has proliferated among students at the school and groundwater quality has been reduced.[55] While Rockwool is considered by many architects to be a relatively nontoxic material for building users—indeed, one that is often cited as key to developing well-insulated buildings that we need to limit the climate crisis—it nonetheless presents a significant bodily risk to those in proximity to the plant that manufactures it. In this case, thinking through bodily risk and challenges to health is an important complement to understanding toxic geographies. Research, advocacy, and practices of continuance can help scholars move from understanding body burdens as isolated toxic impacts, toward seeing lifeworlds as interrelated, structured by both architectural specification and political subjectivity.

## The Essays

### Materials

Our first text in the "Materials" section, "Workers' Bodies and Plywood Production: The Pathological Power of a Hybrid Material," is by Janet Ore, a historian of material culture and the environment whose work on formaldehyde was one of the earliest available to architectural historians of toxics.[56] Her article for *Aggregate* reveals the social, economic, and racial dynamics laid bare in the manufacture of low-cost Douglas fir plywood. Explaining processes of manufacture and use, Ore shows how worker bodies were impacted by the post–World War II boom in US housing. This historical moment not only generated racialized access

to houses, which Dianne Harris has described in *Little White Houses*, but also helped to establish working-class bodies as more susceptible to diseases that result from the widespread use of deleterious industrial processes.[57] Showing how the use of plywood impacted one person, traces of whose life she was able to reconstruct from various archives, and how the plywood industry operated in Washington State, Ore offers a history of how building products directly lead to bodily impacts through physical and industrial processes, material uses and abuses, and effects on workers' bodies and economies.

In the second text for the "Materials" section, "'With-On' White: Inconspicuous Modernity with and on Aesthetic Surfaces, 1910–1950," architectural historian Ingrid Halland and artist and researcher Marte Johnslien examine how titanium dioxide—the pigment used for making bright white paint—was first commercially produced and marketed in Norway before it started circulating globally as a ubiquitous material in paint, plastic, paper, cosmetics, and medicine. Reading promotional films and advertisements made by one of the primary companies responsible for its international dissemination, as well as the scientific histories of its development, they show not only how this "whitest white" pigment changed the aesthetics of surfaces in architecture and design, but also how it was positioned to reinforce gendering and racializing stereotypes. While the pigment itself might be inert, the social toxicity of its promotion tied this material to other forms of racial whiteness circulating from 1920-50. Drawing from and contributing to the literature on whiteness in modern architecture by Anne Anlin Cheng, Dianne Harris, and others, as well as texts on racialization and coloniality in European architecture by Lesley Lokko, Itohan Osayimwese, Irene Cheng, Charles Davis II, Mabel O. Wilson, and many others, Halland and Johnslien argue that the toxicity of titanium dioxide is cultural—what they define as an "inconspicuous modernity"—as much as material.

## Grounds

In the first text in the "Grounds" section, "Unknowing Wastelands in Noah Purifoy's Desert Art Museum," Lisa Uddin, an art historian and scholar of Black visual culture, examines the artist Noah Purifoy's Outdoor Desert Art Museum in Joshua Tree, California, a project he began in 1989. In her chapter for *Race and Modern Architecture*, published in 2020, Uddin explored Purifoy's engagement

with waste and "junk," and for *Aggregate* she develops this work further to show how the artist's work is entangled in multiple toxic histories: those of desert pollution, commercial refuse, and racial capitalism. Crucially, however, Uddin shows how the residues of toxic landscapes and consumer capitalism can be re-mattered through artistic practice. Purifoy's work helps Uddin and her colleagues and students re-experience these various toxicities. Uddin's inventive methodology of narrating a trip through Purifoy's work helps to open up its experiential dimensions. Her technique of moving between creator and viewer narrates how toxic histories are situated within toxic landscapes and consumer capitalism and how they are made manifest through racialized subjectivities.

The second text in the "Grounds" section is "Thinking Like a Gulch: Pacific War Heritage, Settler Lands, and Subsurface Toxic Uncertainties in Oʻahu," by Desirée Valadares, a landscape historian and critical heritage studies scholar. Valadares uncovers the toxicities in Honouliuli, a 43,000-acre ahupuaʻa, or traditional land and water division in the central plains of Oʻahu, Hawaiʻi. The area, after colonization, was made into a sugar plantation, a World War II internment camp, and a site for growing genetically modified seeds. Honouliuli's gulch landscape was recently acquired by the National Parks Service as part of a series of Pacific War heritage sites. But what heritage is recalled and erased in this act of preservation? Reading this land through an inventive assemblage of multiple methods and media—landscape fieldwork, poetry, contemporary preservation literature, as well as histories of Indigenous land stewardship, military legacies, corporate pesticide use, and Asian diasporic migration—Valadares activates many lenses for understanding the potential forms of heritage at the site. Drawing from recent "volumetric" scholarship in geography and the humanities that explore subsurface land histories, Valadares shows that Honouliuli's settler colonial histories help mark land as simultaneously toxic and preservable. Like Uddin and others, she understands toxicity to be doubled: located both within the polluted ground and in residues of colonial occupation.

## Life

Peter Christensen, an architectural historian, contributes our first text in the "Life" section, "Women in the Scrap Heap: Tetanus, Scrap Metals, and Women's Labor in the Era of the World Wars," as he exposes the gendered histories

embedded in European and American scrap metal heaps, where women workers experienced higher rates of tetanus—an infection caused by the toxin-producing *Clostridium tetani* bacterium—than men. Christensen traces how the danger involved in gathering steel scrap for reuse during World War I resulted in a potential for infection. This body burden created a debt that Christensen claims Euro-American modernist architecture owes to women workers, who did much of the scrap recuperation labor necessary to make wartime construction possible. Tetanus was an invisible threat, but efforts to prevent it were directed at men in the battlefield, not people who participated in the scrap trade. Women's risk and mortality were highlighted only by campaigners for reform, like one of Christensen's main characters, Flora Spiegelberg, who used recycling as a means to provide economic security to single mothers and other economically precarious women. Christensen engages with ecofeminist analyses developed by Vandana Shiva by drawing parallels between Shiva's notions of ecofeminism and Spiegelberg's work to make material recuperation into a strategy for social empowerment. Can ecofeminism be claimed when the end result is a form of modernist celebration that tends to erase the results of female labor?

Jonah Rowen, an architectural historian, provides our second "Life" text, "Pipes, Provision, Profits, Privatization: The Materials of Water Infrastructure in Nineteenth-Century Kingston, Jamaica, and London, England." Rowen's text compares water delivery systems—one made of lead, and one made of wood—in nineteenth-century London, England, and Kingston, Jamaica. In conversation with the growing humanities scholarship on hydraulic citizenship, Rowen's article reveals how infrastructural politics both were impacted by and furthered colonial logics, as well as how architectural actors such as John Soane influenced colonial building design practices through their work on infrastructure. Rowen demonstrates not only how awareness of toxicity shaped uneven legacies of water distribution, but also how architectural thought both shaped and was shaped by colonial infrastructure which produced bodily damage as an after-effect of a design practice that marked some populations as more expendable than others. These material infrastructures, urban designs, and toxicities contributed to processes of racialization, which shaped nineteenth-century conceptions of humanity and citizenship.

Our third release of essays will offer other histories and methodological approaches to these three themes. Please join our mailing list to be informed when they are released.

✓ Transparent peer-reviewed

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1 *Epigraph:* M. Murphy, "Chemical Regimes of Living," *Environmental History* 13, no. 4 (2008): 695–703. *Oxford English Dictionary*, 2nd ed. (1989), *s.v.* "toxic." ↑

2 For issues in formaldehyde products, see Nicholas Shapiro, "Attuning to the Chemosphere: Domestic Formaldehyde, Bodily Reasoning, and the Chemical Sublime," *Cultural Anthropology* 30, no. 3 (2015): 368–93; and Janet Ore, "Mobile Home Syndrome: Engineered Woods and the Making of a New Domestic Ecology in the Post–World War II Era," *Technology and Culture* 52, no. 2 (2011): 260–86. For arsenic, see James C. Whorton, *The Arsenic Century: How Victorian Britain Was Poisoned at Home, Work, and Play* (New York: Oxford University Press, 2010); and Lucinda Hawksley, *Bitten by Witch Fever: Wallpaper and Arsenic in the Nineteenth-Century Home* (London: Thames & Hudson, 2016). ↑

3 These questions are framed in "Chemical Modernities," which is chapter 1 in Jessica Varner, "Chemical Desires: Dyes, Additives, and Foams; Making the Architectural Materials of Modernity (1870–1970)" (PhD diss. Massachusetts Institute of Technology, 2020). For more on how architects can support claims for environmental justice in an inherently toxic world, see Meredith TenHoor, "Toxic Geographies," *Perspecta* 53 (Fall 2020): 218–35. ↑

4 We hope this will acknowledge many scholars and the scholarship in which this project finds its roots. A working version is here, and we welcome additional suggestions for texts to include. ↑

5 Fernando Domínguez Rubio, "On the Discrepancy between Objects and Things: An Ecological Approach," *Journal of Material Culture* 21, no. 1 (2016): 59–86. This work can meaningfully be set in relation to architectural scholarship by Edward Eigen, Timothy Hyde, and David Leatherbarrow, whose work considers the temporality of atmospheres and weather. ↑

6 Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (New York: Praeger, 1966). ↑

7 See Vanessa Agard-Jones, "Bodies in the System," *Small Axe : A Journal of Criticism* 17, no. 3 (2013): 182–92; Katherine McKittrick, *Dear Science and Other Stories* (Durham: Duke University Press, 2021); and Max Liboiron, *Pollution Is Colonialism* (Durham: Duke University Press, 2021). ↑

8 Eve Tuck, "Suspending Damage: A Letter to Communities," *Harvard Educational Review* 79, no. 3 (2009): 409–28, 413. ↑

9 Tuck, "Suspending Damage," 409. ↑

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