

Plastic Matter

Heather Davis



Plastic Matter

BUY

DUKE

ELEMENTS *A series edited by Stacy Alaimo and Nicole Starosielski*

UNIVERSITY
PRESS

Plastic Matter

DUKE

Duke University Press *Durham and London* 2022

UNIVERSITY
PRESS

HEATHER DAVIS

© 2022 DUKE UNIVERSITY PRESS. All rights reserved
Printed in the United States of America on acid-free paper ∞
Designed by Courtney Leigh Richardson
Typeset in Whitman and Helvetica Std by Copperline Book Services

Library of Congress Cataloging-in-Publication Data

Names: Davis, Heather M. (Heather Margaret), author.

Title: Plastic matter / Heather Davis.

Other titles: Elements (Duke University Press)

Description: Durham : Duke University Press, 2022. | Series: Elements |

Includes bibliographical references and index.

Identifiers: LCCN 2021025560 (print)

LCCN 2021025561 (ebook)

ISBN 9781478015130 (hardcover)

ISBN 9781478017752 (paperback)

ISBN 9781478022374 (ebook)

Subjects: LCSH: Plastics. | Plastics—Environmental aspects. | Plastics industry and trade—Social aspects. | BISAC: SCIENCE / Environmental Science (see also Chemistry / Environmental) | SOCIAL SCIENCE / LGBTQ Studies /

General Classification: LCC TP1116. D385 2022 (print) |

LCC TP1116 (ebook) | DDC 668.4—dc23

LC record available at <https://lcn.loc.gov/2021025560>

LC ebook record available at <https://lcn.loc.gov/2021025561>

COVER ART: Red deer stag with fishing line and buoy. Courtesy Ali Morris.

DUKE

UNIVERSITY
PRESS

Contents

PREFACE: Complicated Inheritances	vii
ACKNOWLEDGMENTS	xi
INTRODUCTION: Plastic Matter	1
1 Plasticity	21
2 Synthetic Universality	39
3 Plastic Media	63
4 Queer Kin	81
CONCLUSION: Plastic Futures	103
NOTES	109
BIBLIOGRAPHY	135
INDEX	155



Complicated Inheritances

Most families have a story that gets repeated again and again over dinners, to the annoyance and delight of everyone who's heard it a million times before. In my family it's the story of how my grandfather helped to develop the plastic milk bag. This sealed bladder of milk, a staple of my childhood, is common throughout Europe, South America, Israel, India, and Canada, where I grew up. Family gatherings were loud, chaotic affairs. Cousins ran everywhere while aunts and uncles talked over each other. It was difficult for anyone to get a word in, or finish a sentence. Anyone, that is, except my grandfather, Ken Irvine. He had all the gravitas and entitlement of a white man who grew up on a farm and had succeeded in the burgeoning chemical industry, fully believing in its promises of creating a better world. Ken was married to a beautiful, intelligent woman, Marg, and the father of seven children—a 1950s patriarch par excellence. When he spoke, we listened.

He would tell us the story of the milk bag, and he was clearly proud of his involvement. Later, looking through his documents, I found a speech on the same topic that he had given to a gathering of former employees. In 1964 he was tasked with finding new business opportunities for DuPont Canada. Founded in 1802 in Wilmington, Delaware, as a gunpowder mill, DuPont later turned to industrial chemical production, including the development of synthetic tex-

D

UKE

UNIVERSITY
PRESS



FIGURE P.1. Marg and Ken Irvine in Texas, 1952. Courtesy of the author.

tiles, paints, and polymers like nylon, Tyvek, and Teflon. One morning, while working on the problem of expanding DuPont's Canadian markets, my grandfather's colleague Jean Paul Trudel came into his office and asked: "What's the cheapest way to package a liquid?" "In a bag!" my grandfather replied, and so they began to work on how to package milk in bags. The story goes that when it came time to test the seal on the bag, Trudel marched into my grandfather's office and threw the bag across the room to prove that it wouldn't break. It didn't.

In the speech my grandfather gave at DuPont of this invention, there is no mention of my grandmother. But when he told his story around the dinner table, my grandmother would interject, reminding him that he brought home various milk bags for her to test. As the quintessential suburban housewife, my grandmother was the perfect focus group. The initial milk bag had no corresponding container, so my grandmother had to keep the bags in a bowl or transfer the milk to a pitcher. They would flop around and spill everywhere. "Oh, I really didn't like them," she would say, making a face. Eventually a corresponding plastic pitcher, made from a harder and more durable plastic, was developed to go along with the milk bags. And we would keep a blade, encased



FIGURE P.2. Marg Irvine, early 1950s. Courtesy of the author.

in another kind of plastic, attached by a magnet to the fridge, whose sole purpose was to open these bags.

In the summers we visited my grandparents in Kingston at their sprawling midcentury home across the street from Lake Ontario. We swam at the beach and ate in their meticulously kept backyard. As a child I never paid attention to the “private, for residents only” sign on the fence guarding the beach, or the high-security men’s penitentiary in the near distance. It wasn’t until I was a teenager that I began to register the predominantly white, wealthy bodies on the beach, or the overrepresentation of Indigenous men populating the penitentiary, whose foreboding walls we could see as we swam out to frolic on a raft.

Around this time my high school history teacher, Mr. Cox, stopped during a lesson one day, stomping his foot for emphasis, as he sometimes did, to ask: “Why are we speaking English in the middle of the bush?” This question hit me hard. From that moment, I began to question my presence, my feeling of belonging, on that land, to no longer understand it as inevitable, and to see, slowly, its history of settler colonialism. I had always understood myself as the descendent of immigrants. I was taught to be proud of my English, Irish, and

Scottish heritage, filled with stories of hardship that naturalized my family's presence on the land, rendering it benign. That day in class, looking out into the forest, I began to wonder about the ways in which I do not belong. Why didn't I know the history, language, or culture of the Algonquin and Anishinabeg peoples whose land I occupied, even though a nearby park, one of the most iconic in Canada, was called Algonquin? It was the beginning of what I now understand as a lifelong process of recognizing and questioning how my body participates in forced displacement, genocide, and alienation: not only of Indigenous peoples but also of Black people as well as racialized settlers and immigrants.

I was praised for being the first grandchild to get a PhD despite no one understanding what I studied. My grandmother once introduced me to a friend not by my name but by my title. In other ways, however, I had clearly fallen short. I didn't get married or have kids. I don't own property. It wasn't until I was thirty-eight that I finally got a permanent job. I'm queer and have never brought any of my female or nonbinary partners to meet my extended family. When I was doing my master's degree and living in Toronto, I remember getting a thick envelope in the mail from my grandparents, the same day as massive protests against the start of the Iraq War. I was so excited to open it, thinking it might be a long letter or a present. Instead it was a portfolio explaining how my grandfather had invested \$1,000 on behalf of each grandchild, much of this money in fossil fuels, to teach us about the stock market. My heart sank. I immediately thought of the war and the fact that that fossil fuels are also used as one of the primary means of Indigenous dispossession and environmental injustice. I never finished reading that letter. I also didn't pull the stocks out, fearing it would be insulting.

I tell this story to show how plastic has structured my life but also to open up broader questions of inheritance—namely, how whiteness has influenced the technological and material realities in which we live. As Kyle Powys Whyte has argued, our current ecocidal moment can be understood as living in my ancestor's utopia—that is, the utopia of European-descended settler colonizers.¹ This world is certainly the utopia of my grandfather. And as much as I would like to disavow it, it is mine as well. This book is my own attempt to grapple with this inheritance.

DUKE

Acknowledgments

This work is indebted to and enmeshed in countless conversations, workshops, and the generosity of friends, family, and colleagues. Some of my earliest theorizing of plastic happened through late-night talks with Pinar Yoldas. Although her artworks don't appear in these pages, her brilliant projects, particularly *Ecosystem of Excess* (2014), have been central to the ways I have come to understand and theorize plastic. Terike Haapoja, Jason Pine, Elaine Gan, Jeannine Tang, and David Berring-Porter all provided generous engagement as I neared the end of writing, looking over numerous versions and edits that were invaluable to the coherence of this book. Caitlin Berrigan sent me so many quirky articles on plastic that always blew my mind; she also provided rigorous editorial feedback. Thank you to Tejal Shah for their inspiring work and dedication to queer ecologies. Much gratitude goes to Courtney Desiree Morris for her intellectual and artistic practice and brilliant presence in the world. I am constantly amazed and humbled to have so many magnificent thinkers in my life that are also dear friends.

In between, there were so many who provided attention, detail, encouragement, and necessary critical interventions. Leah Vaughan Aronowsky was the first person to read the book in its entirety; Pablo Rodriguez, Kathy High, Robin Veder, Lauren Berlant, Katrin Hornek, Dehlia Hannah, Gloria Kim, Paige Sarlin, Oliver Kellhammer, Marina Zurkow, Dominic Pettman, Jami Weinstein, Alexander Klose, Eyal Weizman, and Susan Schuppli all gave me much-needed feedback and supported this work in countless ways. Michael Bérubé, and a fellowship with the Institute for Arts and Humanities, created time and space for me to think and write, for which I will always be grateful. I also benefited from two fellowships at the Hagley Museum and Archives that allowed me to look at primary source materials and references. I am immensely grateful for

D

UNIVERSITY
PRESS

the continued support of my teachers Monika Kin Gagnon, Peter Van Wyck, Brian Massumi, and Elizabeth Grosz. Generous collaborators and cothinkers, including Kirsty Robertson, Kelly Jazvac, Kelly Wood, Tegan Moore, and Jennifer Wagner-Lawlor have continued to inspire me and keep me on my toes. I have learned so much about work, generosity, and care from the Synthetic Collective. I am grateful to the participants of the Elements workshop, including the careful comments of Rafico Ruiz, Darin Barney, Yuriko Furuhashi, Ayesha Vemuri, and Burc Kostem. I presented versions of this work at so many venues over the years—thank you to everyone who invited me and engaged these ideas. I also want to thank Michael Nardone, for his abiding love, and infectious love of language, through many years of writing. I have so much gratitude for Waqia Abdul-Kareem, their compassion, support, love, and piercing critical eye. Finally, the ongoing dedication of Stacy Alaimo and Nicole Starosielski to my work has been exceptional, buoying me through moments of difficulty, providing a beacon of feminist inquiry and generosity.

An earlier version of chapter 4, significantly revised for this publication, was originally published as “Toxic Progeny: The Plasticsphere and Other Queer Futures” in *PhiloSOPHIA* 5, no. 2 (summer 2015): 231–50.

Every day I am thankful for my parents, Diane and Phil, and sisters, Alison and Marcy, who always provide a ground of love, support, and intellectual rigor. This book is dedicated to them, for the complications, compromises, and beauty of being-with.

DUKE

Plastic Matter

Plastic is now everywhere, and it seems to transmit its daily banality outward. What could possibly be said about such a terribly mundane material? How can it provoke thought beyond a shrug or exasperated scream at its unfathomable accumulation? As I will argue throughout this book, plastic's presence is an invitation to a broader reevaluation of matter and material relations. This book traces the relationship between plastic and plasticity, following the consequences of engineering matter. I argue that plastic reveals broader assumptions about relations to matter, and how matter is understood under technocapitalism. Plastic matter describes the assumptions that matter is there to be manipulated; it can and should be bent and made pliable; and its potential for manipulation is endless. *Plastic Matter* is a provocation to reexamine all matter in light of plastic's saturation. For plastic is not just any material but is emblematic of material relations in the twentieth and twenty-first centuries, showing how intimately oil has coated nearly every fabric of being, how the synthetic cannot be disentangled from the natural, and how a generalized toxicity is producing queer realities.

D

UNIVERSITY
PRESS

But what, exactly, is plastic?

Plastic, for the purposes of this book, can be defined as “any one of a large and varied group of materials consisting wholly or in part of combinations of carbon with oxygen, hydrogen, nitrogen and other organic and inorganic elements which, while solid in the finished state, at some stage in its manufacture is made liquid, and thus capable of being formed into various shapes, most usually through the application, either singly or together, of heat and pressure.”¹ This broad definition covers the range of plastics that have been manufactured, most of which are dependent on coal, oil, or natural gas for their molecular carbon. There are many different types of synthetic polymers that we call plastic. They are mostly known through their recycling symbols, found on the bottoms of containers that give a false impression of the range of plastics. There are, contrary to those seven recycling symbols, thousands of different kinds of polymers, each with its own characteristics. To these basic molecular compositions, up to eighty thousand additional chemicals might be added to give plastic the qualities that a producer might desire, for example, to make it pink, or heat resistant, or pliable. Some plastics are made from materials such as polylactic acid, which comes from corn, or cellulose, derived from cotton. These sets of polymers are conventionally known as bioplastics or biodegradable plastic.² A range of naturally occurring materials with similar molecular chains (polymers), such as rubber, are sometimes also referred to as plastic. However, these two latter categories of plastics, those that occur outside chemical laboratories, and those manufactured from nonpetroleum bases, fall outside this book’s focus. Rather, I am rather interested in the ways in which fossil fuels have infiltrated almost every aspect of our daily lives, most intimately through plastic, and what this tells us about Western assumptions regarding matter and materiality.

The Indian artist Tejal Shah’s installation *Between the Waves* (2012) depicts many of the central problematics of this book. The artwork creates a world that blurs the boundaries between ancient systems and contemporary form, where humans and our artifacts—plastic chief among them—are thoroughly enmeshed with nonhumans. Occupying a temporal register that is at once past, present, and future, the piece offers a mythic exploration of queer ecologies and a particularly poignant portrayal of a world saturated in plastic. Shah invites their viewers, placed in this mythic world, to see plastic as agential and lively but also as defying easy categorization.³ Much like our own world, there is no escaping plastic in *Between the Waves*. In one scene, it appears that the characters are being birthed from the ocean. Images of them, bruised and bloodied, are juxtaposed with footage of sea turtles coming on land to lay their



FIGURE 1.1. Video still from Channel One, “A Circular Fable,” *Between the Waves*, 2012, by Tejal Shah. Courtesy of Project 88 and Tejal Shah.

eggs. There is something deeply primal about the scene. The characters lie in the sand, with waves passing over them, entangled with all kinds of debris, including Styrofoam and plastic-coated wires. As they rise and help each other wash off, we see that they are clothed in more plastic—bags and film refashioned as tunics.⁴ On one of them, the dress they wear is adorned with numerous CDs, which catch the light. This saturation of plastic, and its creative reuse, mimics the realities that are now present virtually everywhere. There is nowhere you can go to escape plastic. It is in the Arctic, the Mariana Trench—the deepest place on earth, over ten thousand meters beneath the surface of the Pacific Ocean—and on remote mountaintops in the high altitudes of the Pyrenees. It is in the air we breathe and the water we drink. Plastic microparticles circulate through our bodies; nanoplastics penetrate our cell walls.⁵ Its chemical by-products have been found in everyone who has been tested. The world is now plastic.

This inability to filter out plastic, to maintain a neat division between the synthetic and natural worlds, is shown in two other scenes in Shah’s piece. In one, set in a mangrove forest, the characters wade around in the water, picking up plastic trash from the roots of the trees with a scythe. They neatly collect the plastic debris into another plastic bag in order to remove it. Yet, even as this



FIGURE 1.2. Video still from Channel One, “A Circular Fable,” *Between the Waves*, 2012, by Tejal Shah. Courtesy of Project 88 and Tejal Shah.

channel plays quiet and generous acts of care and disentanglement, the viewer is conscious of another channel, which depicts a large landfill, where this plastic, neatly removed from the forest, will end up. It is a poignant reminder that plastic does not go away; it is only put somewhere else. In the other scene, the characters swim underwater with a constructed coral colony, all composed of plastic waste and e-waste. Plastic jellyfish float by. These scenes are intercut with footage of marine life, but the juxtaposition does not pit “artificial” reality with a pure, untainted nature but rather shows the ways that *plastic is now nature*. For despite the fact that plastic was designed as a protective barrier from the earth and other creatures, plastic cannot help but become part of the earth, it is still a material of the earth, even if in a purposefully oblique and engineered fashion.

Between the Waves tells the story of waste colonialism, with countries such as the United States, Canada, and Western Europe using Southeast Asia as a dumping ground.⁶ Although much of India’s waste is generated internally, the artwork reflects the consequences of the aggressive marketing of plastic and plastic products in so-called developing nations, which often lack adequate waste disposal systems to deal with all this plastic.⁷ (But what country really does have the proper infrastructure for the mountains of plastic produced ev-



FIGURE 1.3. Video still from Channel One, “A Circular Fable,” *Between the Waves*, 2012, by Tejal Shah. Courtesy of Project 88 and Tejal Shah.

ery year?) Plastic pollution, as the science and technology studies scholar Max Liboiron has argued, can be understood as a form of colonization.⁸ It is not incidental, in this context, that the first landfill in India was created by the British during their occupation of the subcontinent.⁹ Plastic is transferred to peoples and places that do not consent to all the consequences of plastic and its waste, even if and when these items are produced and used locally. Regardless of where plastic comes from, it has the effect of transmitting a sense of universality; plastic is designed to be divorced from a specific location, appearing as if from nowhere and coating particular places in this sense of globalized unlocality. Here it is possible to see how plastic is imprinted with the colonial logics of dissociation, dislocation, denial, and universality, reproducing itself without regard for local cultures or ecologies. This is what I call synthetic universality, which I take up at length in chapter 2. Synthetic universality refers to the imprinting of plastic with a particular semiotic designed to be universal, placeless, and to deny its surroundings. Synthetic universality describes how plastic is a deliberately alienated material, which enacts its violence through the dislocation from the earth, as part of what Kathryn Yusoff calls “White Geology.”¹⁰

In cases where plastic appears through logics associated with waste colonialism, as in India, I describe this as transmission. Differentiated from inheri-

tance, where plastic becomes the problem of those who invented and benefit from it, transmission describes the imposition of plastic: its legacies on multiple peoples, largely racialized and poor, who deal with the intergenerational effects of plastic but are not responsible for its emergence or proliferation.¹¹ Transmission considers not just waste but the potentially harmful aspects of plastic that include its production. *Transmission*, as I develop it, especially in chapter 3, refers to the ways in which plastic permeates every and all aspects of life on earth, often without the consent of those people and other beings who are most affected by it. Transmission of plastic describes one aspect of the dispossession and the undermining of health and well-being of communities through synthetic universality.

It would be easy to read the ecological ruin in *Between the Waves* as simply dystopian: the amount of waste depicted is overwhelming. But the work also conveys a capacious queer desire—a desire that cannot undo the effects of plastic’s synthetic universality or its participation in waste colonialism but nonetheless offers potential avenues for living with plastic. The artwork is permeated with a queer ecological sensibility that does not turn away from the horrors of our times, or transmit a nostalgia for a pristine past, but instead offers a curiosity about what is present, what is possible here and now.¹² *Queer ecologies* is a term that was developed to contest the heterosexist assumptions built into biopolitical accounts of nature and to reimagine evolutionary processes, ecological interactions, and environmental politics in light of queer theory.¹³ As it is employed in *Between the Waves* and throughout this book, queer ecologies seeks to question the purity narratives that are built around understandings of “nature,” and to open up eroticism, kinship, and care to more-than-human relations. Erotic gestures and acts of care between the characters and all the materials and beings they come into contact with transmit a feeling of connection in *Between the Waves*, even when this connection is built through networks of toxicity. For example, the characters use black plastic gloves to have safer sex with each other and to caress the mangroves, yet these gloves will ultimately end up in the landfill. As I detail in chapter 4, queer ecological care, and the creation of kin through all the novel microorganisms that plastic is birthing, offer ways of living that are more implicated, enmeshed, and earthly, working against some of the universalizing logics that helped create plastic in the first place. This is not an escape from toxicity but rather a reckoning with its permeation.

Almost everything that appears on screen in *Between the Waves* is infused with vitality. This orientation finds resonance with Jane Bennett’s provocative formulation of vibrant matter, and the turn toward understanding the agency of matter. *Vibrant Matter* does much necessary work to deconstruct the lineage

of Western thought that insists that matter is inert and inactive, drawing on the minor literatures of Western philosophy to argue for matter's agential being.¹⁴ Bennett draws attention to the animacies of trash and plastic gloves (although these are not as erotically charged as in Shah's world). Bennett's intervention fits within the broader field of what has come to be known as feminist new materialism. Scholars working in this field have insisted on the importance of not privileging discourse over an engagement with materiality.¹⁵ Feminist new materialism emerged in reaction to an overemphasis on the productive capacities of culture, instead "want[ing] to know how we can define the 'real' in science and how we can describe nonhuman agency in a scientific context."¹⁶ Within this realm of thought nature is understood to be "an active, signifying force; an agent in its own terms; a realm of multiple, inter- and intra-active cultures."¹⁷ These recent turns in contemporary feminist theory are deeply influenced by Karen Barad, who significantly challenged Western understandings of matter and semiotics through her insights in quantum physics. Barad conceptualizes matter and meaning as mutually implicated and co-constitutive, and from this I draw the relationship between plastic and plasticity. Barad's work on the inherent queerness of matter—meaning that matter itself is always queer, always surprising and fundamentally entangled—is echoed in the ways that plastic appears in *Between the Waves* and throughout this book.¹⁸ I presume plastic to have a queer agency, that it is an active, signifying force in the world.

However, it is important to keep in mind that animacy itself is not anathema to waste colonialism. Matter's agential power is not antithetical to contemporary capitalism. Rather, as the art historian Amanda Boetzkes's work has shown, plastic and oil are fundamental to the animating power of capitalism. Boetzkes astutely observes that waste management has become its own form of maintaining economic growth and she and Andrew Pendakis note that plasticity is embedded in all forms of capitalist logic.¹⁹ Boetzkes's work builds off Gay Hawkins's topological reading of plastic. She argues that the economic and cultural value of plastic is enacted rather than produced. Hawkins is particularly interested in tracing the agential qualities of plastic rather than thinking of it as a "passive object of economic forces."²⁰ In particular, she argues that plastic is valuable *because* it is meant to be wasted. Hawkins's work asks after the relations that plastic invites and produces, through detailed examinations of water bottles, plastic bags, and other single-use plastic items. She is also particularly concerned with the different ways that people interact with plastic and its associated waste, with particular attention to varying cultural contexts throughout Asia.²¹

Plastic has become one of the sites at which anxieties over technology and environmental futures merge. Since its invention, and escalating in the 1960s,

people have been deeply ambivalent about plastic and its many promises, seeing it as increasingly cheap, fake, and later, toxic.²² We fear being smothered in plastic, in its sticky, sleek surfaces, our bodies invaded by this foreign, alien material. Yet, we are also attracted to it, and especially to its promises of a clean, sanitary, sterilized life. Despite the fear and revulsion that many now feel toward plastic, we cannot easily give it up.²³ Plastic is used in ever-larger quantities, with an exponential increase over the last sixty years. It is produced in astronomical amounts—about 380 million tonnes (or about 419 millions tons) globally per year—with about 9 percent recycled worldwide. The remainder of this plastic waste (91 percent) is put into landfills, incinerated, or used for durable goods, such as the plastics found in building materials. But much of this incredible tonnage ends up in the wider environment, where it circulates in the currents of air and water. If rates of plastic production continue with contemporary waste management practices, it is predicted that by 2050 twelve billion tonnes of plastic will be in landfills and throughout the wider environment.²⁴ It is hard to fathom such a large number, and we have very little understanding of what this may mean to ecosystems and to human health.

As plastics have entered into the environment, permeating almost everywhere on earth, there has been a large, growing body of literature from across the sciences on the health effects of plastic pollution, plasticizers, and their associated chemicals on all manner of beings. One paper called for plastic to be considered toxic waste owing to the proven and probable negative health and environmental effects on many populations, including humans.²⁵ The authors highlight the fact that if plastic were considered hazardous waste, there would be more incentive to produce less hazardous polymer materials, and existing materials would be handled more carefully.²⁶ They base their conclusions on a number of adverse health effects associated with plastics, including the fact that more than half of the chemical ingredients in plastics are hazardous and can be found to accumulate chemicals in the blood through, among other mechanisms of transfer, medical supplies.²⁷ This study shows that even in cases where plastics are used to improve human health, there can be unforeseen negative consequences, such as when microplastics get into tissues and cells because a person's joints have been replaced with plastic, disrupting cellular processes and degrading tissues.²⁸ There is additional, growing concern over the effect of associated additives, called plasticizers, on health, especially those shown to be endocrine disrupting;²⁹ there is also concern over the capacity of plastics to adsorb other toxic compounds including DDT, pesticides, and polychlorinated biphenyls in waterways, accumulating and dispersing these harmful chemicals.³⁰ We need to take these effects on the bodies of all beings seri-

ously, with critical attention to the ways that plastic differentially harms people along lines of race, class, geography, gender, and ability. When it comes to plastic and its long-term effects in the environment, despite the growing body of scientific literature, there are many more questions than answers.³¹ What we do know is that plastics are inescapable. They are reconfiguring the atmosphere, biosphere, and hydrosphere, so it seems imperative to think with this material. Plastic has radically reshaped the world and our relations to it, even as the question of how plastics may be modifying the world speaks to the aporia of inheritance: we cannot know because the questions we ask, and the environments we are in, are already determined by plastic's presence.

Plastic Matter

Plastic matter, as I develop it, theorizes plastic as a material that embodies and challenges many of the received assumptions about matter coming from Western thought. It is a provocation to reexamine all matter in light of plastic's saturation. Referring to the ways that matter is understood to be plastic, in both the metaphorical and material senses, plastic matter describes the kinds of philosophical assumptions that fostered the conditions for plastic to emerge in the world in the first place. This concept speaks to how the materiality of plastic has been imposed on to our expectations of matter more broadly, how matter itself has come to be produced as inherently pliable, disposable, and consumable. The amorphous, shape-shifting qualities of fossil fuel-derived materials are refracted through the iridescent surfaces and deflective capacities of oil in plastic's plasticity. If we wish to understand material relations in the twentieth and twenty-first centuries, a comprehensive material investigation of plastic is needed. For, as I argue, how we, the inheritors of Western modernity, think about and interact with plastic is indicative of material relations more broadly. And plastic, paradoxically, carries within it many earthly lessons that might be useful in navigating through the current ecological crisis.

Plastic was one of the first materials to be chemically engineered, through the manipulation of molecules, representing the first instance of producing form and matter simultaneously. Unlike a pregiven material, such as clay or metal, which can be molded but must conform to its material constraints, plastic can be produced to have any particular material quality. The terms of materiality within the post-Enlightenment Western project are impressed into plastic, where matter is subservient and dichotomous to the wills and whims of the human mind. Plastic matter highlights how capitalist and colonial systems are dependent on the vitality of objects, the transformational capacities of the nat-

ural world, the endless transmutation of matter, and the creative responsiveness of evolutionary processes. As plastic shapeshifts, it takes on the exuberant energy of long-dead organisms to appear in virtually any form. The fact that plastic can seemingly become anything has consolidated an understanding of matter itself as infinitely pliable. Plastic matter is a descriptive concept, but it is also aspirational in the sense that it describes utopian ideals of technological progress associated with modernity. For plastic, and plastic matter, also relate the deep and profound lesson about earthly life: try as we might to remove ourselves, to maintain a solid division between nature and culture, or the natural and synthetic, everything emerges from and is ultimately folded back into the earth in a fundamentally intra-active process.

Plastic condenses and illustrates the goals of techno-utopian thinking, while simultaneously pointing to their undoing. Plastic matter speaks to this paradoxical relation: the ways in which plastics are impressed with an attempt to violently cleave the world in two, while also exposing how nature and culture can never be separated. Bruno Latour's assertion that modernity proceeds by way of purifying practices could be a way to describe the material relations of plastic.³² Operating as a purifying material, plastic is often understood to be solely in the realm of the human, but it clearly has so many implications for the more-than-human world. The project of imagining nature and culture as two separate realms rests on an underlying assumption, perpetuated within mainstream environmentalist discourses, that the more-than-human world exists ahistorically, without its own capacities to respond and attune. Culture is the assumed place of transformation. Plastic's rapid incursion into the environment intrudes on our notions of the separation of nature from culture. The desire for, and belief that, nature and culture can and should be separated is in, among other things, the idea of wilderness, as manifested in national parks.³³ The opposite and complementary existence of the dump makes obvious an underlying belief that we can and should separate the human from the rest of the world through regimes of management.³⁴ Plastic, because of its transportability and ubiquity, disrupts these constructed boundaries. It is "matter out of place" as it is found blowing in the wind,³⁵ caught in trees, or being eaten by turtles in those same protected parks. It refuses to stay in landfills. This complication and disruption of boundaries happens at more fundamental levels than simply plastic's dispersion, as evidenced in novel geologic formations such as plastiglomerate, a mixture of plastic, sand, and other debris, which I take up in chapter 2. Despite the fact that plastic is the arch-synthetic material, it remains thoroughly of the earth. Everything is ultimately enfolded back into the geologic layer, including plastic. As it fuses with the wider ecology, plastic is turned back

into its basic composition as rock and oil, just as it becomes a new food source for bacteria and fungi.

Emerging from technoscience and technoculture, plastic matter shares a particular dissatisfaction with the world as it is, or in being in the present, attuned to its multiple nuances and contradictions. As Donna Haraway elaborates, “Twenty-first century technoscience and technoculture are nothing if not frontier practices, always announcing new worlds, proposing the novel as the solution to the old, figuring creation as radical invention and replacement, rushing toward a future that wobbles between ultimate salvation and destruction but has little truck with thick pasts or presents.”³⁶ The rush toward a future is, in many ways, a desire to remove responsibility, to displace it onto peoples and generations at a remove from the current moment and location, to move so quickly as to evade repercussions. It is a desire for an existence that is less messy, less enmeshed with earthly life. The link here between the goals of technocultures and Western, colonial mentalities is not accidental or incidental. These ideologies are animated by a will to forget and disavow the violence of extraction and of technological transformations of everyday life: an impulse and belief that if we simply run fast enough, or move far enough, we can escape past violences, the haunting legacies of extraction and colonialism that have brought us to this place. The millions of years that go into the creation of a plastic item, and the indefinitely long time it will take for that plastic item to decompose, are seemingly obliterated by the fact that we often use plastic packaging for, at most, a few months, compressing deep time into what seems like an eternal, and eternally replicating, present. This time is not one that sits with the present to fully account for it; rather, plastic encourages a fleeting present that eats time.

Synthesis of Petrocultures

Contemporary petrocultures that are read through plastic stress their intimacies and molecular saturations rather than their infrastructures, such as pipelines or oil wells. Petrocultures inquire into the material, social, and political imaginaries brought into being through fossil fuels. Oil has structured not only our energy systems but our understanding of democracy, freedom, and liberal political philosophy.³⁷ Similarly, plastic creates the contemporary world. It is not just on everything, *it is everything*, and it makes the realities and imaginaries that we have come to take for granted possible. It is necessary to think plastic in relation to petrocultures as plastic production is increasingly responsible for fossil fuel emissions and is bound to fossil fuel production.³⁸ The supposed fric-

tionlessness of global consumer supply and circulation is enabled through the sleek, slippery surfaces of plastic, while they also divorce us from the metabolic rhythms of the earth.³⁹ Plastic is emblematic of the relations of *petrocapitalism*, a term originally developed to describe the political and economic structures of nation-states to oil production but here employed in a wider sense to think through the particular formation of advanced capitalism that depends on and is enabled by widespread access to fossil fuels.⁴⁰

Although oil precedes plastic, both as a source material and also, obviously, by tens of thousands of years, there is a circular logic between oil and plastic that Amanda Boetzkes and Andrew Pendakis highlight: “Oil generates a plastic operation. Every aspect of the oil industry relies on techniques of transposability that we can associate with plastics as circulating commodities and with plasticity as a myth of eternal and limitless transformation.”⁴¹ Here, Boetzkes and Pendakis draw attention to the ways in which plastic operates as the medium of our oil economy, but they also show that the metaphorical associations of plastic, as infinitely malleable, influence how that economy expands. Plastic, produced from oil, reproduces and multiplies its logics through plastic matter.

Materialized as a sealant, barrier, or container, plastic matter embodies the Western desire to rid ourselves of our obligations, relations, and connections to the land. The ability of plastic to seal an object or person off from the broader environment lends the material to an imaginary where technology can shield us from harm. From hazmat suits to Tupperware’s ability to “vigilantly protect vulnerable leftover food from all external threat,”⁴² plastic becomes the imagined barrier to protect from other forms of injury. Synthetic textiles, or what the art historian Kirsty Robertson calls “petrotextiles,” are paradoxically used to keep oil workers safe as they work on rigs or in potentially explosive situations on fracking sites.⁴³ Petrotextiles are industry standard, despite the fact that these materials are themselves highly flammable, therefore requiring huge amounts of flame-retardant chemicals to make them safe. Landfills are also lined with plastic, in order to seal in plastic and other waste, to prevent leachate from entering groundwater.⁴⁴ Oil products are used to protect us from oil products. These examples illustrate the circular operations of plastic matter.

Although science and technology studies (STS) and related fields are more clearly established in their relationship to biology and physics, there is a growing body of work that is interested in examining the social, political, ethical, and cultural dimensions of chemistry.⁴⁵ It is significant that most of this work addresses questions of environmental justice in relation to the effects of the chemical industry, and in particular to petrochemicals.⁴⁶ These literatures help develop an understanding of the body as transcorporeal,⁴⁷ or as viscously po-

rous.⁴⁸ In other words, they are interested in molecular movements, recognizing that the openness of our bodies, the ways that our bodies are constituted by the outside, means that we are vulnerable to the chemicals found there. These literatures help to orient the insights of the nonsovereign body toward a politics of environmental justice.

Plastic is deeply embedded in what the environmental historian Michelle Murphy has called “chemical regimes of living.”⁴⁹ These regimes extend the biopolitics of life to the molecularization of life,⁵⁰ and they speak to the ways that our worlds and bodies are increasingly saturated with the novel molecules of chemical engineering. Despite the lively and interesting effects of such a transformation to our environmental and bodily being, “synthetic molecular relations, fostering a chemical regime of living in which it is commonplace and legally acceptable for such molecular relations to escape state regulation or the spotlight of research,”⁵¹ mean that the harms associated with synthetic chemicals are often disproportionately transmitted to oppressed communities without their consent. Therefore, it is necessary to think through plastic not just as an interesting material, for to do so would be to replicate the harms of Western-style thinking, but as one that enacts particular forms of harm carried by way of a set of principles that impress its materiality.⁵²

Methodology

Thinking with and through plastic has not been an easy task. It is something so present, so ubiquitous, that it risks becoming invisible. It is also a material that could be described, in Timothy Morton’s language, as a “hyperobject”—that is, an object massively distributed in time and space to the extent that it cannot be realized in any particular local manifestation.⁵³ Clearly, plastic has many local manifestations, but plastic matter involves this massive distribution. This is in part because of the alienated quality of plastic, its dislocation from time and space through the production process, as Robin Wall Kimmerer identifies. Her argument is worth quoting at length:

Looking over the objects on my desk—the basket, the candle, the paper—I delight in following their origins back to the ground. I twirl a pencil—a magic wand lathed from incense cedar—between my fingers. The willow bark in the aspirin. Even the metal of my lamp asks me to consider its roots in the strata of the earth. But I notice that my eyes and my thoughts pass quickly over the plastic on my desk. I hardly give the computer a second glance. I can muster no reflective moment for plastic. It is so far

removed from the natural world. I wonder if that's a place where the disconnection began, the loss of respect, when we could no longer easily see the life within the object.⁵⁴

Plastic Matter asks: How did we get to this place of disconnection, and why has it become so normalized? What effects have the assumptions about matter that informed the creation of plastic had on the world? And what happens if we do attempt to see the life within the object as potential queer kin? One of the premises of many strands of critical thought is that there is a recursive relationship between materiality and ideas. Thought manifests materially. *Plastic Matter* traces this recursive relationship between ideas and materiality to do the difficult task of thinking with, rather than passing over, plastic.

Just as plastic is not bound by a particular location, neither is this book bound by a particular discipline. *Plastic Matter's* primary impetus is to follow plastic where it leads, attending to the ways in which it is both reshaping our material surroundings and inviting a critical reappraisal of how matter is understood within Western thought. This means that I trace the scales of plastic, showing how the molecular is intimately connected to the molar. Despite the ungainliness of these jumps, they are necessary to understand how we have arrived at a world so saturated with plastic. Plastic here is treated as an element. As the media studies scholar Anne Pasek writes, this poses particular challenges, as "elements are everywhere, within and composing everything."⁵⁵ Thinking plastic elementally, as I do, requires an expansive overview, which clearly has its methodological pitfalls. The scale of this book's ambitions, and its brevity, risk reproducing some of the universalizing logics I argue are impressed into plastic itself. But I hope that this approach affords a new way to think about plastic as a spur to reconsider the semiotic impressions of matter, and what such impressions tell us about our relations to the more-than-human world. If I have shown, via plastic, the recursive relations of the West's conceptions of matter and the conditions of its production, my goal is to invite an altogether different form of material relations.

In addition to thinking plastic elementally, I am driven by a methodological approach that values and privileges intimacy. If, in much critical thinking, there is a distance that is presumed and required in order to see clearly, with plastic no such distance is possible. Instead of thinking about this as a methodological pitfall, I take it as an opportunity to ask what it might mean to get closer to difficult or problematic objects. What might it mean to take these enmeshments not as what we must distance ourselves from; instead, by getting closer to objects we may abjure, what lessons might be found? This is a

methodological intimacy that hopes to stage a process of care taking or making meaningful of objects and materials that are otherwise taken for granted, made invisible, or seemingly too big to think about, too abstract or alienated.

I think through the intimacies of plastic, in part, through my own direct inheritances of it, and how inheritance in general provides a framework for thinking through the task of making worlds that always lie before us. For the philosopher Jacques Derrida, inheritance is always in the making as it works through us. I use the word *inheritance* because it also refers to how structures of privilege and power are passed on. As a term, *inheritance* is still primarily used, both legally and informally, to speak of property relations. *Inheritance* is defined, in the *Oxford English Dictionary*, as the “succession to property, a title, office, etc.”; “a coming into, or taking possession of something, as one’s birthright; possession, ownership; right of possession.”⁵⁶ Inheritance as right, possession, and property indicates how Western modernity conceives of intergenerational time. Here, we become with the world through our objects. Inheritance as property, rather than as skills or ways of being, assumes a naturalized relation to capital and to colonial extraction and is about the ways in which filial relations, patriarchy, and race unfold across generations, consolidating, rather than redistributing, privilege. As the American studies scholar George Lipsitz writes, this kind of inheritance works “especially through intergenerational transfers of inherited wealth that pass on the spoils of discrimination to succeeding generations.”⁵⁷ I argue throughout this book that we can think plastic matter in similar terms. Plastic matter describes the intergenerational transfers of wealth, the differential accumulations of toxins, and the effects that these have on thinking about questions of power and privilege through the lenses of capitalism and settler colonialism. I take this up especially through the case study of southern Louisiana in chapter 3. Plastic matter also describes unexpected openings, if we are willing to sit with the conditions that we find ourselves within, offering queer reworkings of kinship that may help to see a way to worlds otherwise.

Although plastic can now be found everywhere, or anywhere, on earth, this book is grounded in the United States. There are two primary reasons for this geographic circumscription. First, I have lived in northern North America for my entire life; this land represents the limits of my own knowledge. Second, the primary centers for the birth of plastic were the United States and Germany. As I will argue throughout, this was not incidental but carries a particular orientation to philosophies of matter that originate in Western thought. The setting of the United States offers the further advantage of making the connections between settler colonialism and plastic clear.

Chapter Summaries

All studies of materiality are shaped by plastic matter. As a result, many of the categories that have anchored humanistic analysis—body, subjectivity, media, infrastructure—need to be reexamined in light of plastic matter. I do this through each of the chapters. Beginning, in chapter 1, with a historical overview of plastic and its infrastructures, I argue that the concept of plasticity predates the set of materials we have come to know as plastic but deeply informed how it was made. As an object of technoscience, plastic bears the traces of plasticity, where matter is understood as a field of limitless potential. This orientation has profound implications, not just for how plastic has shaped the world, but for all our material relations and infrastructures. Understanding plasticity's connection to matter makes clear the philosophical investments of technoutopianism in times of ecological crisis. For plastic matter is still very much with us, beyond plastic itself, as it also manifests in various climate engineering schemes, for example. Tracing plasticity through plastic makes these investments more obvious.

Chapter 2 focuses on a novel geological form, plastiglomerate. This new composite material invites an appraisal of how plastic matter penetrates into the geological layer, not simply to be read as a particular linear time map but to serve as an invitation to see the multiple unfoldings of matter across time. Plastic is frequently used as a marker of geological time in the framing of linear time. For example, plastic is one of the main stratigraphic markers within the geological literature of the Anthropocene. The Anthropocene has been widely critiqued as a concept by humanities scholars, primarily because of its lack of accuracy in attributing responsibility for contemporary ecocidal conditions, and its reinstantiation of a universal human. Kathryn Yusoff has also made clear that one of the other problems with the Anthropocene is the presumption that linear time can be read into the rocks of the earth.⁵⁸ Stratigraphy itself was built on an ordering of the materiality of time through sequential strata. Certainly, this is a useful way to be able to read the earth and its various phases, but it can also lead to gross simplifications. In the case of plastic, it is not enough to be able to show that it occupies a particular register in the stratigraphic layers, as plastic is composed of the compressed bodies of ancient plants and animals, themselves unearthed. In other words, plastic has to be read in at least two ways: through its contemporary placement and through its ancient origins, but this already begins to complicate the presumed linearity of materialized time that is the earth's strata, already suggesting that there are multivalent ways to read these layers of the earth that may in fact be more like the timescales of

Between the Waves, not easy to place in either the past, present, or future, not easily pinned down to only one time. I trace the geological relations of plastic through plastiglomerate, which not only incites these questions of earth's readability but also brings into focus the fact that the natural and synthetic world cannot be disentangled, only violently cleaved apart.

Chapter 3 examines the relationship of media and bodies in petro-time. Plastic bends and compresses time in such a way that it becomes a vector between the deep past, through oil, and the deep future, because of its persistence. Petro-time describes the plasticity of time itself, the way that petrochemicals haunt and saturate these multiple condensed presents. Petro-time forces the geological past into the present, transmitting the harms of unearthed matter. Thinking through the embodied consequences of so much plastic and its associated chemicals in the environment, I show how petro-time scrambles intergenerational time, as the effects of toxic exposure may skip generations. By taking photography as my main medium and southern Louisiana as my main site of analysis, I reexamine how plastic haunts people and places. Photography is a medium that is dependent upon petrochemicals, as it also conveys a sense of time's passing. I read the haunting potential of photography through the petrochemicals that it transmits. Similarly, the polyvinyl chloride (PVC) plants of southern Louisiana map a complicated relation to petro-time that dispossess primarily Black communities, where settler colonialism haunts the landscape. The companies of "cancer alley" are read as a form of anti-Black atmosphere that enacts an intergenerational violence through petro-time. Here, it is easy to see the colonialism of pollution directed toward the preservation of white supremacy, the ways that plastic's plasticity continues to be transmitted to specific bodies.

Chapter 4 expands the focus on intergenerational time, inheritance, and transmission to think about networks of queer kin that are inadvertently being birthed by the proliferation of plastic. The microorganisms that are appearing as a result of plastic's proliferation—the new bacteria that have evolved in order to eat plastic—invite a reconfiguring of categories of kin making, to extend beyond not only normative family units, or even the more-than-human world, but also these slightly abhorrent technobacterial becomings. This queer ecological imaginary does not condone the violence of petrochemical companies, but it also refuses a bucolic past, asking those of us who are the inheritors of plastic to become accountable to our bacterial children.

DUKE

UNIVERSITY
PRESS



FIGURE 1.4. Video still from Channel Two, “Landfill Dance,” *Between the Waves*, 2012, by Tejal Shah. Courtesy of Project 88 and Tejal Shah.

Conclusion

How do we begin to situate a feminist “response-ability,” as Donna Haraway has called it, to these broad lines of connection from our ancestors to our queer descendants?⁵⁹ Landfill Dance, one of the channels of *Between the Waves*, depicts what the title would suggest: multiple femme performers dancing on top of a landfill in costumes equipped with improvised gas masks. The dancers’ gestures come from ballet and contemporary dance but also convey an intimacy, and even aspects of care, with the garbage that they are dancing on and crawling over, just as their bodies are nearly swallowed up by this giant pile of trash. In one instance, a dancer picks up a tiny ceramic jug, examining it, demonstrating an attentive curiosity for this putrid environment. This video can be understood as an indictment of what we have made of the world, how it has been rendered toxic and uninhabitable. Importantly, though, it also asks us to move closer to this site of devastation, to move in, to become acquainted and to invite creativity and movement. This invitation to become more curious about plastic does not eschew the very real damage it is doing, but it does ask us to learn to become more accountable, more enmeshed.

Plastic shows us both the ways in which colonial technologies can have a profound effect on the world around us and how matter and bodies are defined

through their responsive capacity to change, evolve, adapt. Plastic asks us to become attuned to these divergent realities: to think through the consequences of technological development and the ways they distribute harm and possibility, while simultaneously understanding that the proliferation of any technology is beyond human control. For as much as it is tempting to believe that our technologies evidence mastery over the world, they merely show a particular rearrangement of the practices, forms of life, and life forms, often with unintended and unforeseen consequences.

Derrida advocated for and developed the concept of hauntology over the Marxist materialist emphasis on ontology. Hauntology emphasizes openness, transformation, and self-transformation. For Derrida this “means not simply accepting this heritage but relaunching [*relancer*] it otherwise and keeping it alive. Not choosing it (since what characterizes inheritance is first of all that one does not choose it; it is what violently elects us), but choosing to keep it alive.”⁶⁰ Petrocapitalism chooses to keep plastic alive at the expense and sometimes to the benefit of humans and other beings. But the self-reflective capacity of choosing to keep it alive seems rote, a question of upholding infrastructures already in place, rather than a commitment to developing an ethical relationship with materiality and matter. How might we begin to shift this hauntological relation, instead of only being subject to the elected legacies of chemical violence? Might we also see in plastic new forms of queer kinship and responsibility? Might the proliferation of plastic be understood as an opportunity to reevaluate the terms of techno-utopias, the disposability and manipulability of matter, and the ever-accelerating present? These inheritances of some of our ancestors demand a working-through that shows the lively and deadly effects of plastic matter and desire for utopias that might morph and bend and refract, and violently rip apart the earth and its relations. But they also, inadvertently and unintentionally, point to new modes of relating, new forms of queer composition and kinship-making that invite new ways of thinking about and relating to matter.

DUKE

UNIVERSITY
PRESS

PREFACE. COMPLICATED INHERITANCES

- 1 Whyte, "White Allies."

INTRODUCTION. PLASTIC MATTER

- 1 Masson, *Story*, 6.
- 2 Some of the ways in which biodegradable plastics are marketed as an environmentally safe alternative are misleading. For example, many biodegradable plastics require industrial composters and therefore will not biodegrade in either a domestic composter or a landfill. Additionally, the starch sources that form the base of bioplastics often come from food items such as corn, which implicitly invites the question of whether we want to be using agricultural lands for making plastic. For a more thorough analysis, see Fairs, "Bioplastics."
- 3 *Between the Waves* is composed of a five-channel video installation, first commissioned for dOCUMENTA (13). In reverse order, Channel Five taps out a strobe message, communicated in Morse code, that flashes too quickly across the screen to decipher. Channel Four is an animation of transformation, where faces and bodies of humans and other animals merge and morph into each other, as well as into eyes and apartment buildings, escaping any easy identification. Channel Three is a long take of a crescent moon made of acrylic mirror pasted onto cardboard. The moon catches fire, seemingly through the intensity of the sun, and slowly burns down to ash. The next two channels have people in them, interacting with surreal, otherworldly landscapes. Channel Two, "Landfill Dance," shows multiple femme performers dressed in plastic costumes dancing on top of a huge urban landfill. The final screen, Channel One, "A Circular Fable," comes closest to a narrative, where two main characters move through a mythical world that unsettles fixed notions of utopia and dystopia, fiction and reality. The characters are equally enigmatic, dressed in the manner of the performer from Rebecca Horn's iconic feminist

DUKE

UNIVERSITY
PRESS

performance *Unicorn* (1970–72), which uses imagery borrowed from Frida Khalo's *Broken Column* (1944). The “humanimals,” as Shah calls them, do indeed blur the boundaries between humans and other animals. They also convey a capacious eroticism that involves homosexual acts between them as well as a generalized queer ecological sexuality expressed by stroking trees and caressing the sand.

- 4 These costumes were made from materials gathered from a raddi-wala or kabaddi-wala—that is, a local recycling person. According to Shah, these people are becoming increasingly scarce in India, although they were quite common in the 1980s and 1990s.
- 5 Lehner et al., “Emergence.”
- 6 For more on waste colonialism, see Liboiron, “Waste Colonialism.”
- 7 The documentary *The Story of Plastic* (2020), directed by Deia Schlosberg, does an excellent job of explaining how plastics are marketed and sold differently to European and Asian countries.
- 8 Liboiron, “How Plastic Is a Function.”
- 9 The Deonar landfill is the oldest in India as it was set up by the British in 1927. Situated on the outskirts of Mumbai, the landfill receives approximately one thousand tonnes of waste daily, and measures more than thirty meters high. It frequently makes the news because of methane emissions that have led to intractable fires.
- 10 As Yusoff writes, “The semiotics of White Geology creates atemporal materiality dislocated from place and time—a mythology of disassociation in the formation of matter independent of its languages of description and the historical constitution of its social relations.” Yusoff, *Billion Black Anthropocenes*, 16.
- 11 I am grateful to Waqia Abdul-Kareem for pushing me to think more deeply about the fact that we are not all the inheritors of plastic; rather, there needs to be a differential analysis in talking about the intergenerational legacies of plastic. They suggested the distinction between inheritance and transmission, so the credit for the term *transmission* properly belongs to them.
- 12 This queer ecological sensibility, which permeates *Between the Waves*, is also expressed through the appearance of “totem animals” in each of the five channels, that flash across the screen. These totem animals, which Shah considers protective deities, consist of turtles, pygmy sea horses, and blind salamander. They are all “queer animals.” As outlined by Bruce Bagemihl in his influential book *Biological Exuberance*, more than 450 species display same-sex coupling, eroticism, or child raising, and many other forms of life, such as bacteria, have a startling and vast array of reproductive capacities and genders.
- 13 For an excellent definition of queer ecologies, see Sandilands, “Queer Ecology.” There is a rich and growing body of literature in this field, one that often highlights the contested relationship between sex and nature but also questions notions of purity, offering avenues for generatively thinking through toxicity. See Chen, *Animacies*; Ah-King and Hayward, “Toxic Sexes”; and Ahuja, “Intimate Atmospheres.”
- 14 While I very much appreciate the necessary theoretical intervention that Bennett puts forth, I am troubled by the ways in which her claims to agential matter seem to systematically ignore both the long traditions of Indigenous thought that never

cleaved the world apart by separating matter from mind and the lessons of Black theory where matter could never be understood as lacking agency because of the ways in which people were made into objects. There is so much more to be said on this topic, in particular the slippage between the universal “child” that Bennett draws from to understand matter’s agency and the ways in which both Indigenous and Black people are continually infantilized. For more sustained critiques of racial blindness in Bennett’s work, see Todd, “Indigenous Feminist’s Take,” and Jackson, “Outer Worlds.” For a critique of the ways in which vitality and liveliness are cast in a too-positive light, not attending to the ways that matter can be both vital and deadly, see Buchanan, “What Must We Do.”

- 15 Alaimo and Hekman, *Material Feminisms*.
- 16 Alaimo and Hekman, *Material Feminisms*, 7.
- 17 Alaimo and Hekman, *Material Feminisms*, 12.
- 18 Barad, “Nature’s Queer Performativity.”
- 19 Boetzkes, *Plastic Capitalism*, 8, and Boetzkes and Pendakis, “Visions of Eternity.”
- 20 Hawkins, “Made to Be Wasted,” 49.
- 21 Hawkins, Potter, and Race, *Plastic Water*.
- 22 There are deep resonances here with the ways that queer people and communities have similarly been described as “cheap, fake and toxic.” This is part of the reason that I argue that plastic should be understood as having queer agency. Thanks to David Bering-Porter for this insight.
- 23 As I revise this book in the midst of the COVID-19 pandemic, people are increasingly turning to plastic for its associations with sterility and cleanliness. While this may be the case for single-use medical equipment, there is wide evidence to suggest that plastic is not the best material for keeping the general public safe. The plastics industry has taken advantage of the conditions of the pandemic to push for rollbacks on various bans on plastic bags and other single-use plastics. For a comprehensive account of the use of single-use face masks, see Allison et al., “Environmental Dangers.” For the ways in which industry has been pressuring governments to roll back single-use-plastic legislation, see Leber, “How Big Plastic.” For more general discussion of plastic during the pandemic, see Denne, “Coronavirus Pandemic”; Ossolo, “Pandemic”; and Scaraboto, Joubert, and Gonzalez-Arcos, “Using Lots of Plastic Packaging.”
- 24 Trowsdale, Housden, and Meier, “Seven Charts.”
- 25 Rochman et al., “Classify Plastic Waste.”
- 26 It is important to recognize that different types of plastic constitute different potential risks. According to MacBride, “The toxicity of polymers containing chlorine and styrene and of plastics containing certain additives in the phthalate category is well documented, while polyethylene and polypropylene do not suggest risk.” MacBride, *Recycling Reconsidered*, 182. This has played out in places like Reserve, Louisiana, where the risk of cancer from air toxicity is fifty times higher than the national average. For more details, see the extensive coverage in the *Guardian*. Larty and Laughland, “Special Report.” I also take up the relation between plastic and environmental racism in chapter 3.

- 27 Rochman et al., “Classify Plastic Waste,” 170.
- 28 Rochman et al., “Classify Plastic Waste,” 170.
- 29 Thompson et al., “Plastics.”
- 30 Teuten et al., “Transport.”
- 31 Part of what plastic reveals is that our current understandings of environmental harm are often inadequate. It is widely acknowledged throughout the scientific literature that there is a need for many more studies on the relationship between plastics and health, as a number of questions remain unanswered. Considerably more research is needed on the mechanisms for the uptake of toxic chemicals found on and in plastics that are ingested by animals, and the subsequent effects on those bodies. A significant challenge to all these studies is the fact that it is often difficult, or outright impossible, to establish control groups, as people or animals who have not been exposed to plastic and its associated chemicals are virtually nonexistent. Additionally, plastics and their chemicals are not circulating in the environment alone. Instead they interact with other chemicals and toxins in our environment, producing what is referred to as the “cocktail effect,” the compounding of various chemicals that may be benign individually but harmful in combination. JRC Science for Policy Brief, “Something.” It is practically impossible to study these cocktails as there are simply too many possible combinations and effects on the bodies of a range of beings. These prolific problems indicate the ways that plastics and their potential health effects pose serious challenges to how scientific knowledge is acquired, especially in relation to environmental health. They point to how plastic is inherited or transmitted differentially across populations, and how methods of replication and control are often impossible with chemicals in the wild. In other words, plastics and other environmental toxins ask us to reconsider some of the ways that we have been trained to think about public health and environmental harm. Max Liboiron has been actively questioning the epistemological problems associated in analyzing and producing knowledge about plastic pollution in the lab that she founded, the Civic Laboratory for Environmental Action Research (CLEAR). The lab is dedicated to thinking through feminist and anticolonial protocols of citizen science—how we might need to change the very relations of the production of knowledge in order to deal with these “miasmic” pollutants. See Liboiron, *Pollution*. These are the kinds of practical solutions that are required to break free of the pervasive logics of what I call plastic matter.
- 32 Latour writes that “‘purification,’ creates two entirely distinct ontological zones: that of human beings on the one hand; that of nonhumans on the other.” Latour, *We Have Never Been Modern*, 10–11.
- 33 National parks were also part of the process of Indigenous dispossession, as Dina Gilio-Whitaker makes clear. See Gilio-Whitaker, “Story.”
- 34 Hird, “Waste,” and Hird, “DEW Line.”
- 35 Douglas, *Purity and Danger*.
- 36 Haraway, “Speculative Fabulations,” 243.
- 37 Timothy Mitchell traces how the infrastructures of coal enabled forms of unionization that pushed for increased democratic participation in society and then

how the availability of oil undermined these efforts. Mitchell, *Carbon Democracy*. Dipesh Chakrabarty argues that the concept of freedom arose in tandem with the widespread use of fossil fuels. See Chakrabarty, "Climate." In their edited volume, Sheena Wilson, Adam Carlson, and Imre Szeman trace how liberal political philosophy is deeply embedded with what they call "petroculture," or the ways that fossil fuels have saturated all aspects of culture. Wilson, Carlson, and Szeman, *Petrocultures*.

- 38 As the journalist Tim Dickinson writes for *Rolling Stone*, "Global plastics production and incineration currently creates the CO₂ pollution of 189 coal plants. By 2050, that's expected to more than triple, to the equivalent of 615 coal plants. At that rate, plastics would hog about 15 percent of the world's remaining 'carbon budget,' or what can be emitted without crossing the two-degrees Celsius threshold in global temperature rise that scientists warn can trigger calamity." Dickinson, "How Big Oil."
- 39 Klose, *Container Principle*.
- 40 Watts, "Resource Curse?"
- 41 Boetzkes and Pendakis, "Visions of Eternity," 6.
- 42 Fenichell, *Plastic*, 233.
- 43 Robertson, "Oil Futures/Petrotextiles."
- 44 Hird, "Waste," 111.
- 45 Bruno Latour, Donna Haraway, and Annamarie Mol are all seminal to biological approaches to STS; Karen Barad and Isabelle Stengers have been central to the development of STS of physics; discussions of chemistry are sparser but gaining more traction. For historical work, see Bensaude-Vincent and Stengers, *History*, as well as Klein and Lefèvre, *Materials*. More recent work on the STS of chemistry has addressed its vibrancy coupled with its harms. See especially the special issue of *Cultural Anthropology* on "Chemo-ethnography," edited by Nicholas Shapiro and Eben Kirksey (2017), and the special section *Chemical Entanglements: Gender and Exposure in Catalyst: Feminism, Theory, Technoscience* (2020), edited by Rachel Lee.
- 46 Murphy, *Sick Building Syndrome*; Murphy, "Chemical Regimes"; Murphy, "Distributed Reproduction"; Murphy, "Alterlife"; Shadaan and Murphy, "Endocrine-Disrupting Chemicals"; Povinelli, *Geontologies*; Shapiro, "Attuning"; and Agard-Jones, "Spray."
- 47 Stacy Alaimo coined the term *transcorporeal* to emphasize the imbrication of human bodies not only with each other but with nonhuman beings and physical landscapes. Alaimo, *Bodily Natures*.
- 48 Nancy Tuana argues that viscous porosity "involves recognizing the interaction of nature-culture, genes-environment in all phenomena" that include human categorizations, such as gender and race, but that also incorporate more-than-humans as well. Tuana, "Viscous Porosity," 209.
- 49 Murphy, "Chemical Regimes."
- 50 Rose, "Molecular Biopolitics."
- 51 Murphy, "Chemical Regimes," 698.
- 52 In this way, we can understand plastic to be "storied matter," as the cultural the-

orists Serenella Iovino and Serpil Oppermann have developed the term. Matter, understood as active and agentic, “can be ‘read’ and interpreted as forming narratives, stories.” Iovino and Oppermann, “Introduction,” 1. Matter itself participates in an ongoing process of historiography, where stories emerge from and with the interaction and co-constitution of beings and their environment, and that these relations and histories can be understood as narratives, as stories. This understanding of storied matter draws significantly on the transformative work of the feminist science and technology scholar Donna Haraway, who argues that “every being that matters is a congeries of its formative histories.” Haraway, *Haraway Reader*, 2. Haraway highlights the mutual interactions of the material and semiotic worlds. Also building from Haraway, the environmental humanities scholar Timo Maran argues for what he calls the “semiotization of matter,” which describes the ways that humans imprint semiotic patterns into matter, writing our stories onto matter in a way that can be harmful to how other beings perceive and interpret the world, as in the way I formulate synthetic universality. Maran, “Semiotization.” Western Enlightenment values have been imprinted into plastic, leading to the disruption of other patterns of semiotizing matter by humans and more-than-humans.

- 53 Morton, *Hyperobjects*.
- 54 Kimmerer, *Braiding Sweetgrass*, 155.
- 55 Pasek, “Fixing Carbon,” 4 (unpublished manuscript).
- 56 *Oxford English Dictionary*, “inheritance.”
- 57 Lipsitz, *Possessive Investment*, vii.
- 58 Yusoff, “Geosocial Strata.”
- 59 Haraway, *Staying With the Trouble*, 34.
- 60 Derrida and Roudinesco, *For What Tomorrow*, 3.

CHAPTER 1. PLASTICITY

- 1 Susan Freinkel, “A Brief History of Plastic’s Conquest of the World,” *Scientific American*, May 29, 2011, <https://www.scientificamerican.com/article/a-brief-history-of-plastic-world-conquest/>.
- 2 The potential combustibility of celluloid is described by John Hyatt in rather humorous, if macabre, terms: “Consequently a lighted cigar applied to the balls would at once result in a serious flame and occasionally the violent contact of the balls would produce a mild explosion, like a percussion guncap. We had a letter for a billiard saloon proprietor in Colorado mentioning the fact and saying he did not care so much about it but that instantly every man in the room pulled a gun.” *World of Plastics*, 28.
- 3 Meikle, *American Plastic*, 11.
- 4 Meikle, *American Plastic*, 97.
- 5 Levi, *The Periodic Table*, 154.
- 6 This is perhaps most evident in Roland Barthes’s short essay “Plastic,” where he writes, “Until now imitation materials have always indicated pretension, they belonged to the world of appearances, not to that of actual use; they aimed at reproducing cheaply the rarest substances, diamonds, silk, feathers, furs, silver, all