REACTIVATING ELEMENTS

CHEMISTRY, ECOLOGY, PRACTICE

DIMITRIS PAPADOPOULOS,
MARÍA PUIG DE LA BELLACASA,
AND NATASHA MYERS, EDITORS

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FROM COSMOLOGY TO EPISTEME AND BACK

Dimitris Papadopoulos,
María Puig de la Bellacasa,
and Natasha Myers

Reactivating. Calling a recognized entity into a new situation; catalyzing new modes of thought and action; waking up new insight from the slumber of the familiar and the mundane. Reactivation, in the sense of reactivity, also recalls the agency of chemical substances. *Elements*. From the chemical elements to the elementals earth, air, fire, water—and back. Simultaneously evoking and blurring the ancient and modern, the elements have been brought back in recent years to speak in old and new tongues, in diverse contexts and practices, generating other ways of storying long-standing narratives. *Reactivating Elements* draws the nonlinear historical significance of elemental thought into contemporary practice, while inviting new provocations and curiosities about these ever-present and simultaneously elusive phenomena.

The elements are activated in the chapters of this collection in different ways, reflecting on and responding to the messy mixtures of elemental matters, energies, and modes of thought and practice shaping Earth's troubled ecologies today. These accounts engage the elements capaciously, taking up both the periodic table of the elements inscribed by the discipline of chemistry (Stengers) and those irreducible "elemen-

tary forms" that ground theories of social and political life (Helmreich, Hayden). They examine the elements as both the condition of existence and as what we dwell in, considering how the elements atmospherically mediate collective forms of belonging and social action, inciting new modes of "conspiracy" (Choy). By letting these multiple approaches to the elements react in this interpellating present, we call on their substantial and figurative potential to propel new ways of thinking, making, and doing that can respond to this planet's current predicaments.

Elemental thought is persistent. See how it bends time by looping ancient cosmologies into contemporary practices. Cosmologies, like Empedocles's four elements of earth, air, water, and fire, which parsed the elements into forces of nature and states of matter, remain salient today, informing Western ontologies and epistemologies as well as popular culture, while also grounding modern chemistry. Or consider how chemistry's periodic table of the elements remains ever-expanding, enabling the analysis and manipulation of matter at the scale of atoms, particles, and waves (Masco). The periodic table features prominently as one of chemistry's most precious devices, consolidating its disciplinary identity as a science and shaping the social and material worlds that we find ourselves in today. And at the same time, other elemental systems remain at work today in practice and culture. Chinese systems, with a world made of earth, fire, water, wood, and metal, continue to ground healing arts and philosophies in and well beyond China. Ancient alchemists with their passionate efforts to transmute the elements continue to spark speculative imaginaries today, while shamans and witches the world over continue to conjure other futures by allying with elemental forces (Puig de la Bellacasa). And while some elemental systems identify the elements as "natural" forces and substances external to the realm of human action, multiple Indigenous cosmologies, including those which ground practice and knowledge in communities today, approach the elements differently. Witness Indigenous land protectors on the front lines of local and global sovereignty movements who attest to the inseparability of land and body (Murphy). Or the affirmations of many Indigenous peoples of Turtle Island (so-called North America) who teach that water is not just a state of matter but rather that "water is life" (e.g., McGregor 2014). Perhaps what "moderns" chide as the "animisms" of non-Western ontologies stem precisely from Indigenous refusals to deanimate or disenchant the elements or to render them separate from human praxis and culture. Where some elemental cosmologies disavow such entangle-

ments of nature and culture, Indigenous cosmologies (e.g., Kimmerer 2015; Simpson 2017) teach the deeper significance of what those of us caught within the constraints of colonial grammars gesture at when we say "naturecultures" (Haraway 1997).

As feminist science studies scholars have long affirmed, ontologies and epistemologies are fundamentally intertwined (see Barad 2007; Haraway 1988), such that the substances, forces, and energies that come to matter in a given world are inextricable from concepts, theories, and techniques engaged to know that world. Elements and elementary forms oscillate between substance and semiosis, figure and ground, episteme and cosmology, shaping how and what we come to know. It is in this sense that different epistemic iterations of the elements can be seen to activate diverging materialities, congeal distinct substances and meanings, and matter distinct worlds. Elemental thinking demands challenging entrenched epistemological and ontologies binaries—such as those that neatly distinguish what we see as living and nonliving (Schrader). Holding the chemical and the cosmological together may arouse the elements' transformative figurative potential. Many of the contributions in this collection document the different ways that elemental practices converge and diverge. And what these thinkers show is that however well-defined the elements appear to be, they are simultaneously elusive and unpredictable (Papadopoulos). If we let the elements lure our attention and alter our methods (Dumit), they can open up unexpected and generative insights into the actualities of our social, political, and ecological conditions and inspire interventions that activate other modes of world making (Bresnihan).

There is another reason why this collection explores multiple registers of the elements in one breath. The editors and the contributors came to meet around this project through intellectual, political, and personal friendships developed within our work in critical and feminist science and technology studies (STS). It is this community of practice that grounds our creative and undisciplined reactivation of the elements—the medium, we could say, that brought us together in the first place.[1] From a science and technology studies perspective, to call in the elements is to shape what comes to matter in technoscience: we call for a shift of attention to the techniques, processes, affects, and intensities that churn soils, airs, waters, and fires up together with organic and synthetic chemicals in order to attend more fully to bodily potentials, relations, toxicities, and harms. Yet the works included here also inherit and contribute

to multilayered stories that go beyond an intervention in one research field. While rooted in perspectives, debates, methods, questions, and ways of thinking from within STS, *Reactivating Elements* connects and draws inspiration from a range of interconnecting discourses and bodies of thought, in particular the anthropology of science and technology (see, e.g., Choy 2011; Dumit 2004; Hayden 2003; Helmreich 2009; Masco 2004), political ecology (see, e.g., Bennett 2010; Ernstson and Swyngedouw 2019; Robbins 2012), environmental humanities (see, e.g., Alaimo 2016; Coole and Frost 2010; Rose 2004; Tsing 2015), more-than-human geography (see, e.g., Braun and Whatmore 2010; Clark 2011), history and philosophy of science (see, e.g., Barad 2007; Bensaude-Vincent and Stengers 1996; Lefèvre and Klein 2007), media studies (see, e.g., Parikka 2015; Peters 2015; Starosielski 2015), and, of course, the field of thought that brought back the elements into intellectual cultural imaginaries by developing contemporary elemental theory (see, e.g., Cohen and Duckert 2015; Macauley 2010; Neale, Phan, and Addison 2019).

What makes this collection distinctive in its contribution to current elemental analyses is that we do not begin with an overarching theory or model of thought about the elements. Instead, we start with an exciting convergence of thinkers whose works have largely been attuned to elemental phenomena (atmospheres, chemicals, water, soil, fire, wood, and more), even if they had not centered the elements as an analytic in their work. When we invited the contributors to this collection, the brief was open, trustful. The invitation to contribute was made in the spirit of speculative inventiveness, since we knew that all these scholars are committed experimenters. We wanted to see what forms of elemental thought could take shape from attentions already so carefully attuned to lively and deadly materialities, temporalities, and relations of power in our technoscientific worlds. In shaping this project, we appealed to authors who had inspired us, such as Tim Choy's (2011) ethnography of air pollution, Cori Hayden's (2007, 2012) work on the relation between the chemical and the political, Stefan Helmreich's (2009) accounts of oceans and waves, Joseph Masco's (2004) research on radioactive nucleotides and mutant ecologies, Michelle Murphy's (2017) decolonial analyses of industrial chemicals, Patrick Bresnihan's (2015, 2016) inquiries into the contemporary politics of the more-than-human commons, Astrid Schrader's (2010, 2017) theorization of posthumanist attunements with ambivalent algae toxicities, Joseph Dumit's (2004, 2012) experimental methods for documenting the implosions we call brains and

pharmaceuticals, and Isabelle Stengers's approach to the making of science (Stengers 1993) and the practice of chemistry (Bensaude-Vincent and Stengers 1996). Of course, the invitation was driven by some of our own research commitments too—Dimitris Papadopoulos's (2011, 2018) proposition for alterontological technoscientific experimental practices, María Puig de la Bellacasa's (2014, 2019) investigations of more-than-human soil relations, and Natasha Myers's attentions to lively chemistries and their affective ecologies (Hustak and Myers 2012; Myers 2015). And so, our engagements with the elements draw on long-standing conversations on matter and materiality across fields.

In this volume, these influences set the elements into motion to alter our thinking and generate unexpected activations. The effect is an exploration that multiplies claims to what matters in thinking about the elements in theory, method, and practice. We are attuned to conceptions and attentions that keep elemental thought open and responsive to the "ecologies of practice" (Stengers 2010) that shape our multiple, shifting, and overlapping obligations to the worlds we research and for which we write. The contributions involve the elements in different ways: as chemical categories, as cosmological forces, as material things, as social forms, as forces and energies, as sacred entities, as experimental devices, as cultural tropes, as everyday stories, and as epistemic objects. Yet they are also all compelled by the elements' ambivalence as material chemical substances, by their embeddedness in ecological relations, by the relevance of their sociocultural and political actuality, and by their potential to galvanize alternative *practice*. Multidimensional, multiscalar, multisited, multimodal: this volume activates ways of palpating the elemental multiverse.

Throughout this volume, there is also a common, underlying sense of urgency for more attention, appreciation, and care for how human and more-than-human beings, their agencies and collective dynamics, are shaping Earth's possible futures. How can thinking with the elements help us engage with the precarious situation of contemporary life and death in technoscientific worlds? How does a world begin to look when we think it from its elementals and their compositions and decompositions? The elements and their relations always exceed our renderings of them and so push us to develop more subtle analytics about their ongoing material and energetic rearrangements. Who, we must ask, are the "agents of elemental rearrangement" terraforming the earth today (Myers 2017)? Who and what are responsible for composing the elements and

facilitating their decomposition? How are we implicated in the proliferation of damaging chemicals? How can we promote nonviolent elemental relations? In sum, what, in this time of late industrialism (Fortun 2012), are our obligations and responsibilities in mediating the distribution and redistribution of the elements?

The call to wake up elemental thought is, in part, an effort to thwart the dire thinking perpetuated by Anthropocene logics. To disrupt current imaginaries of the inevitability of apocalypse, we reactivate the elements as both more-than-human and more-than-natural forces. We recognize that humans are not the only agents terraforming Earth and simultaneously that how people rearrange the elements has serious worldly consequences. The anthropocentrism of Anthropocene rhetoric tends to vault "Man" to the position of ultimate agent and arbiter of our current predicaments. As many critics charge, this logic continues to perpetuate the delusion that humans are alone, separate from nature, and that technological fixes are what will mitigate disaster or provide the ultimate exit strategy from this damaged planet (see, e.g., Davis and Todd 2017; Haraway 2015; Myers 2018). In this volume, we reckon with the ways that the elements are not just matters and forces whose natures are the domain of science and industry and whose power is beyond the human. We read the elements not as the nature which "humanity" must struggle against or tame, but as naturecultures. In this vein, if climate change can be understood as a rearrangement of the elements at a planetary scale in the aftermath of colonialism, productivism, and their extractions, then at least we will never again think of the atmosphere as a nonhuman matter.

Reactivating the elements allows us to think not only against Anthropocene logics that fetishize human primacy but also beyond the partitioning of species thinking. By drawing on insights from the more-than-human turn, we seek to go beyond entrenched oppositions between life and nonlife (e.g., Povinelli 2016) and between substance and process in order to engage with biogeochemical processes of breakdown, compounding, decay, and corrosion, with an attention to cosmic, cosmological, and cosmopolitical relationalities. By tapping into cosmic, earthly, and human agencies and attending to the accountabilities, responsibilities, and obligations involved in these reactivations, these texts examine how we might learn to do life and death on this planet otherwise. In short, these chapters offer expanding views of this moment of elemental upheaval.

The chapters in this book activate various aspects of thinking with the elements. Each contribution bonds with and cleaves to others, linking together diverse questions of substance, ecology, actuality, and practice. Some chapters present research around one element in the style of empirical science and technology studies scholarship, others activate conceptual and methodological interventions, some generate speculative fabulations, and some do all of that in one.

ELEMENTS AS RELATIONAL SUBSTANCE

Today, technoscience dominates thinking around the elements as the *substance* that makes the world. Biology tells us that life is made possible by four organic building blocks: carbon, hydrogen, oxygen, and nitrogen. Chemistry and physics see the elements as the primary constituents of matter, with organic and inorganic worlds ultimately breaking down into hydrogen, helium, iron, and more. For most economists, industrialists, and engineers, the elements are resources that are isolatable, combinatory, and divisible; they are raw materials for warfare, electricity, agriculture, pharmaceuticals, and the bioeconomy. The elements are mattered as extractable commodities, alienable bits of life and death and nonlife, and as energies that fuel global economies. They are put to work in large-scale state and industrial infrastructures—from dams to wind farms. And those consigned to extract value from the elements must labor in high-risk jobs inside industrial plants synthesizing chemicals, in oil and gas wells extracting fossil fuels, and in mines harvesting valuable minerals. For those who labor, and those who live downstream from the toxic ecologies of late industrialism, the elements and their rearrangements are simultaneously hazards, harms, and hopes.

Reactivating Elements opens with an introductory intervention by Isabelle Stengers, who has transformed the way we think about what the sciences mean and what they do by calling us to both value and be wary of their specificities and powers. We learn from her contribution why we should resist any purified definition of elements. Stengers also offers a critical history of the elements of chemistry that attempts to recognize their specificity and at the same time refuses to think of them in isolation from other naturecultural reactivations in technoscience. She addresses ideas that resonate throughout this collection, inviting contemplation about compositions and decompositions, relational affinities and invariants. Her chapter beautifully situates the overall project

of this collection as an exploration of "agency as freed from the opposition between living intentionality and the inorganic." She approaches elements as "metamorphic": "both shaping and being shaped by the particular ecology in which they participate."

"What is an element capable of?" is a key question that structures Dimitris Papadopoulos's chapter. The ecologies in which chemicals emerge or are manufactured and their presence in them cannot be separated. By engaging with different registers of ecology and envisioning chemistry beyond science as "chemical practice," Papadopoulos sketches a nonreductionist way of engaging with the world from the perspective of chemicals, an approach that tries to avoid the binarism between a critique of chemical horrors and the celebration of their powerful achievements—the two dominant poles of engagement with chemical pervasiveness. His contribution asks fundamental questions for our chemically compelled times: What practical obligations could emerge from a nonbinary approach to the ubiquity of anthropogenic chemicals? And what are the meanings of ecological reparation and justice within this context?

In chapter 1, Stefan Helmreich approaches elements as organizations of matter, energy, and life and puts them in discussion with the irreducible "elementary forms" that animate the history of social theory. He looks at resonances between the ways Mendeleev found a logic to drive his periodic table of elements and the way Durkheim defined "the social" as an "elementary form" of organization with a similar ambition: "one that posits social organization as a composing logic." In turn, twenty-first-century elemental thinking refuses clean and clear divisions between science and society, nature and culture, the inorganic and the organic. For Helmreich, this is "an attention to hybrids, chimeras, and material-symbolic mixtures—as well as their inextricable multispecies politics." Helmreich's reactivation of water and waves inherits both old and new elemental thinking and invites us to rethink water and its waves as an "elementary form" of both social and elemental life.

Joseph Dumit's chapter makes salient what is implicit in the three first chapters: elements as relational substances. Driven by passion for the specificity of a substance, Dumit believes that "each substance is elemental." He invites us to consider bromine, a highly reactive element, through the ways that it surprises (or reactivates) the specialists who study it. Crucially, he attends to method and asks whether there are "processes that keep us enthralled to our existing concepts" that are "keep-

ing us from seeing more"? He looks to bromine's activities in his multiple research contexts, from its role in the fascia that holds our bodies together, to its function in drug design, to its toxic effects in fracking fluid. The chapter becomes an exploration of the unknowns that can unsettle researchers' methods and concepts. By studying substance through its effects and its affects, we learn not only about bromine but also about how substances put the vocabulary of researchers "into variation." When Dumit suggests that a "substance can become a method of undoing one's theoretical assumptions," we are invited into another dimension of reactivation that opens our thinking and theories to change as we encounter different substances.

ACTUALITIES OF THE ELEMENTAL

The adventurous empiricism of Dumit's bromine investigations leads to the following four chapters, which engage elements in their actuality, asking how elements are in the making and how they are always tightly imbricated to earthly ecologies and to wider cosmic and human powers. Papadopoulos reminds us of Whitehead's rendering of a molecule as a "nexus of actual occasions" (1979, 73) and "a historic route of actual occasions." This can also be said of elements. Different ecologies, different cultures, orders, economies, and matters activate different distributions of elementary forces. Therefore, they are always already entangled in local ecologies and in historically and geographically situated social, cultural, political, and economic ways of doing life.

Astrid Schrader's chapter is a plea for a more-than-human approach to agency that takes actuality seriously. Schrader engages with debates in geography, social theory, and science and technology studies in concert with elemental thought to investigate how viruses mediate the biogeochemical rearrangements of the oceanic carbon cycle. Engaging contemporary ecocriticism's reactivation of elemental theory, Schrader reframes the elements as partners in world making, challenging entrenched distinctions between life and nonlife. For her, viruses are forms of life-nonlife that she refigures as "elemental ghosts," not as sensible things but "of the sensible." Taking viruses as a guide, she opens up a mode of thought that pushes past ingrained assumptions about immutable ontologies and into a way of engaging elemental substance as process and relation. Here, the elemental activates an exploration of a nonanthropocentric

carbon imaginary that extends beyond the sociopolitical realm and also cuts through the dichotomy that entrenches the inertness of the geological in opposition to the liveliness of the biological.

In the next contribution, Joseph Masco starts with a question that reactivates elements thinking in all its actuality: "What is a world actually made of?" Inquiring about "a" world and not "the" world tempers any absolutist inquiry into the elemental and the quest for elemental origins. Contrasting the orderly portrait of the world offered by the chemists' periodic table with the messiness and complexity of actual ways of living lays the ground for an exploration of the materials that have become sociotechnical signatures of the Anthropocene. Masco calls these substances "ubiquitous elements": the artificial compounds that nuclear war and mass production have distributed across the planet. The chapter explores the technoscientific, political, and affective history of two very different ubiquitous substances: the new eternals, which are the most fetishized elements (plutonium and other radioactive elements) and the indecomposables, which are the most mundane materials (plastic). Masco makes these familiar compounds strange, showing how these actualities were consolidated in mid-twentieth-century industrial and military achievements radiating from the Global North, and how they thus became an ontological condition on planet Earth, turning one time into deep time.

Patrick Bresnihan's chapter opens with a vivid description of the effects of wind on people and land on the west coast of Ireland, inviting readers to feel the presence and experience of wind through culture, myth, and poetry. This immersion reactivates the material semiotic power of the weather's elemental forces. Wind has acquired new historical roles with climate change and the intensified elemental forces it has unleashed (e.g., Boyer 2019). Wind now labors for capitalism, enrolled as a form of "work/energy" to drive green economic growth. Wind as resource is a "new frontier." Bresnihan's analysis makes salient a thread that runs through this collection, perhaps made more explicit by his search to both counter the economization of wind and seek alternative readings and practices. Bresnihan scrutinizes attempts to harness wind in Ireland and reveals how industrial efforts to capture wind have cascading destructive effects. Then, in contrast to dreams of "smart" ecological modernization, he offers a "speculative antidote" to wind farms as a way to "re-enchant wind" by engaging nonscalable wind projects that re-

figure it beyond "anthropocentric interest" and as a potentially unwilling collaborator in lively, precarious, and more-than-human experiments.

Cori Hayden shifts our attention from blustering winds to swarming crowds with a chapter examining the elementary forms of social life that generate the "collective effervescence" associated with crowds' irreducible dynamics. What are crowds made of? What makes them hold together? But also, what does it mean to think with crowds today? Exploring how crowd theory has changed between the nineteenth century and today, Hayden shows how elemental thought, complete with its chemical and physical metaphors, is deployed to describe social behavior. Crowds are seen to behave like waves, fire, and wind, dissolving the individuated liberal subject into swarms of energy, "imitation rays" and magnetizations that override individual drives, propelling social movements, both liberatory and repressive. Assertively addressing the entanglements of crowd theory with early twentieth-century fascism, racism, and elitism, Hayden examines how crowd theories "vividly recompose social theory's vocabularies for parts, wholes, and the ties that bind." We learn how nineteenth-century crowd thinking—led by social theorists such as Gabriel Tarde and Gustave Le Bon—diverges from liberal democratic thought that locates the elementary forms of social action in the rational individual. And yet, as social media swarms and crowds assert their power to reshape democratic processes, Hayden looks to crowd theory's efforts to "recompose the elements of social action and analysis" as a way to remind us of both the political force of elemental thought and the illiberalism endemic to liberal democracies.

ELEMENTAL PRACTICES

Against the background of agitated and urgent questions around environmental politics and the future of life on Earth, the last three contributions to this volume call upon a form of elemental thinking that keeps our analyses grounded in relations of power. Who and what have the power to rearrange the elements, to terraform Earth and alter its atmosphere? Colonial conquest, the industrial revolution, extractive capitalism, and late industrialism have all staged particular relations with the elements. Thinking with the elements can help us learn how to describe what Michelle Murphy (2017) calls "alterlife's chemical relations"—its toxicities, harms, and extinctions. Yes, the catastrophe is now. And yet

we need to get beyond descriptions of our dire present to dare to dream of alternative practices within these worlds. We cannot forget that for many working intensively to resist the toxic legacies of industrialism—including Black and Indigenous communities, and communities of color, ecofeminists, neopagans, and ecological activists—the elements retain sacred, relational, naturecultural potentials. Thinking with the elements may be one way to wake up the alchemical, creative agencies of the cosmos and resist efforts to enclose them as resource and commodity. How do we learn to live with and work against industrialism's elemental aggregations, assemblages, arrangements, and rearrangements? Is it possible to rearrange our relations with the elements to activate what Papadopoulos (2018) calls "alterontologies"? How can reactivating the elements help us attend to the making and unmaking of worlds? The last three chapters take what María Puig de la Bellacasa calls "ecopoethical license," fusing ecology, poiesis, and ethics to practice elemental forms of speculative fabulation. Enlisting creativity and invention in service of activism, these contributions engage artmaking, artworks, and artists to move beyond the text and to catalyze new questions about our obligations and responsibilities to elemental relations. Here the elements reactivate us as practitioners of alterlife, as co-conspirators with the elements in efforts to resist harm and violence, while attempting to transform earthly processes of living and dying.

Thinking with soils, as proxies for the earth element, María Puig de la Bellacasa proposes that embracing the breakdown of matter is a way to create alternative paths that respond to the ways technoscience chokes up the biogeochemical cycling of elements. She engages with the ethicopolitical dimensions of a contemporary ecocultural reactivation of elements, one promoted by an imaginary of planetary elemental affinities, fed by scientific storytelling and ecological aesthetics, as well as by political theories of the elemental commons. Contesting the powerful cultural imaginary that equates life with growth and attainment, Puig de la Bellacasa engages with soils through the biochemical processes of breakdown, decompounding, and decreation. Meditating on the ethical, poetical, and poietic significance of embracing breakdown for the ongoing reshaping of "the ecological," her "panethnographic" research invokes accounts of "bioremediation" as a noninnocent, practical enactment of "breakdown ecopoethics" to contribute alternative stories of more-than-human relations that might not only celebrate common material earthly

affinity but also activate solidarity with the present struggles of soils in their actuality—neglected, sealed, and contaminated.

In Tim Choy's chapter on atmospheres, air's agency is embraced as a more-than-human arrangement with those who breathe it. Choy's chapter explores the "viscerality" of the concept of "breathers" as those beings who must "pay" for the unpaid costs of capitalism, the market externalities that accumulate in the airs we breathe. Choy emphasizes the "unequal shared cosubjection" of breathers in a disrupted atmosphere and uses the creative form of comic strip style drawings as a mode of speculative experiment to provoke a kind of atmospheric reckoning of our intimate relations with air and with one another. He mobilizes the concept of conspiracy, whose root meaning is to *con-spire*—that is, to breathe together—to imagine a *conspiracy of breathers* as a political formation that might resist the industrial drive to pollute. His drawing practice thus becomes part of "a speculative project of collectivizing response to massive, patterned forms of environmental violence" and a method to transform the ways we may account for this loss. His remarkable drawings in the "Museum of Breathers" amplify the more-than-human interdependencies that can compel us to respond, proposing we become accomplices in a co-conspiracy that can rearrange relations in this unequally shared atmospheric milieu.

Reactivating Elements ends with a contribution by Michelle Murphy on the "alterlife" of persistent organic pollutants in and around the Great Lakes, in the aftermath of the "industrial exuberance" of Chemical Valley—an industrial corridor built on stolen Indigenous land that is responsible for more than 40 percent of Canada's petrochemical processing. Murphy tracks the flows of rainfall that wash the PCBs (polychlorinated biphenyls) accumulating on urban skyscrapers out through stormwater sewers into Lake Ontario, swirling in great eddies of contamination and enduring exposure. She shifts technoscientific genealogies from the mainstream critics of science to Black and Indigenous thinkers, artists, and activists leading decolonial movements. Murphy identifies state-sanctioned permissions to pollute as elements of a colonial project and exposes corporate strategies that create "infrastructures of not knowing" to avoid even the minimal self-reporting of industrial emissions that governments demand. She calls this infrastructural gaslighting and invites us to focus on documenting and studying colonial violence rather than damage narratives that tend to put "the burden

of representing violence on already dispossessed communities." In the mode of speculative fabulation, she ends the chapter with an invitation to visualize an expansive iconography for industrial chemicals that can account for their extended relations of harm and violence.

These final chapters vividly express another thought perceptible throughout the whole collection: a call for experimental practices committed both to collectively exploring alternative ways of experiencing environmental destruction and to activating potentials for alternative elemental rearrangements. And so, going beyond complacent critique, *Reactivating Elements* engages with elements in diverse actual occasions, methodological configurations, and practical involvements, experimenting with forms of storytelling, concepts, and methods with the hope of triggering possibility and a sense of obligation toward worlds we participate in making. Throughout this book we are watchful for how elemental thinking can offer new ways to make sense of, and to care for, the naturecultures we are actively and continuously worlding.

NOTE

1. This collection started with a panel titled "Elements Thinking" at the 4S/EASST conference "Science and Technology by Other Means: Exploring Collectives, Spaces and Futures," August 31–September 3, 2016, Barcelona, Spain.

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