



Chemical Regimes of Living

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FORUM

chemical regimes of living

IN CANADA, THE COUNTRY in which I work and live, the increased price of oil, itself linked to the war in Iraq, has recently made the extraction of oil from the “Tar Sands” of Alberta economically profitable. At this same historical conjuncture, Canada has elected its first prime minister from Alberta, a province characterized by an almost Texan neoliberalism and minimal environmental regulation. The extraction of oil from the Tar Sands is not only an energy and water intensive process, it is also profoundly polluting.

Meanwhile, the residents of the small town of Fort Chipewyan, many of whom are members of the Athabasca Chipewyan First Nation, recently have been disturbed by the rise of rare cancers in their community. Their local doctor responded with alarm and sent a report to Health Canada, a federal department, requesting an investigation. After some media attention, Health Canada’s Alberta arm complied, concluding there was no unusual incidence of cancer, and then proceeded to file a formal complaint against the troublemaking doctor with the Alberta College of Physicians and Surgeons. The charge was met with political outrage and eventually dismissed. In the last few years, one can witness a proliferation of nongovernmental organizations (NGOs) now investigating the Tar Sands and rallying behind Fort Chipewyan.¹

While Americans often have made a stereotype of their neighbor to the north as a land of socialist compassion, Canada is also the United States’s largest supplier of oil and a participant in a larger transnational political economy of accumulation and dispossession. And not only the Canadian state, but the people

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of Fort Chipewyan, who live downstream from the Tar Sands—whose chemical byproducts most likely caused cancer in their community, as well as all the molecular relations externalized and imperceptible that we do not yet know about, are caught in this larger political economy. Cars, militarization, water, laws, the direction of a river, the price of oil, the properties of sand, the rise of neoliberalism, histories of colonial dispossession—are all part of a complex of *molecular relations* that extend outward in place, and into the past, as well as forward to uncertain futures.

It has become a truism that synthetic chemicals have traveled to distant crevices and niches of the globe. Largely produced by over a century of petroleum-dependent industrialized capitalism, these varied molecular modifications range in duration, mobility, and effect, offering us a world changed in ways both subtle and overwhelming. The intensification of production and consumption in recent decades has yielded a chemically recomposed planetary atmosphere to alarming future effect, while it has penetrated the air, waters, and soils to accumulate into the very flesh of organisms, from plankton to humans. Not only are we experiencing new forms of chemical embodiment that molecularly tie us to local and transnational economies, but so too processed food, hormonally altered meat, and pesticide-dependent crops become the material sustenance of humanity's molecular recomposition. We are further altered by the pharmaceuticals imbibed at record-profit rates, which are then excreted half metabolized back into the sewer to flow back to local bodies of water, and then again redispersed to the populace en masse through the tap. In the twenty-first century, humans are chemically transformed beings.

Historians are able to offer this grand claim—that humans are chemically transformed—not only because the material world has indeed changed, but also because the last fifty years have seen the rise of technoscientific practices and modes of governmentality that together make the molecular realm newly legible and politicizable. The British sociologist Nikolas Rose, in his work elaborating on Michel Foucault's notion of "biopolitics," has argued that we are witnessing a new politics of life within contemporary biomedicine, a central feature of which is the *molecularization of life*, defined as the emergence of technoscientific practices—such as within genomics, biotechnology, and neurochemistry—that refocus health and life at a molecular register, thereby populating life with new molecular-scale entities, processes, and relationships.² The molecularization of life, moreover, has been accompanied by a new "bioeconomy" encompassing everything from commodified organisms, to biotechnology, to biobanking, to pharmaceutical development.³ For Rose, the molecularization of life in biomedicine also is characterized by a new "style of thought" modeled on genomics that emphasizes information, individualized risks and individualized variations.⁴

The geographer Bruce Braun helpfully builds on Rose's thinking to draw attention less to an epochal shift toward molecularization, and more to its layering onto other already existing forms of biopolitics that we inherited from the nineteenth and twentieth centuries—from sewers to eugenics.⁵ Here we can also

include the history of infectious disease, as Nash argues in this forum (pp. 651-658). Importantly, for Braun, our understanding of molecularization also needs to widen to include the production of new ways of naming and managing *precarious lives* unable to achieve the individualized monitoring of health and hypervaluation of life that Rose discusses. Braun argues that molecularization offers—through such disciplines as virology and immunology—a vision of a world chaotically and dangerously interconnected by unpredictable viral exchanges. While Braun and Rose both theorize the molecularization of life through biomedicine and microorganic domains, I want to suggest that some of these insights might fruitfully extend to questions about the nonorganic molecular realm of pollution and toxicity.

That it is now possible to detect multiple, individualized, and low-level accretions of synthetic chemicals in organisms can be understood as a symptom of this molecularization of life. But when it comes to questions of pollution, perhaps it is more appropriate to discuss the historical emergence of a *chemical regime of living*, in which molecular relations extend outside of the organic realm and create interconnections with landscapes, production, and consumption, requiring us to tie the history of technoscience with political economy.⁶ Through such practices as toxicology, gas spectrometry, and body burden testing, it is now possible to render legible (and contestable) the molecular relations that characterize the conditions of a factory floor, a body of water, food, or breast milk. Even without directly using these techniques, it is commonplace to postulate the existence of unwanted and unseeable molecular exposures in everyday life linked to both processes of production and habits of consumption. We are in a new chemical regime of living in which not just genomes but the atmosphere, water, soil, nourishment, commodities and our very bodies are apprehendable as caught in possibly toxic molecular relations.

Inquiring about the history of the molecular relations of life as understood through synthetic chemicals involves excavating a more fraught and complicated relation to capitalism than Rose's account provides.⁷ First, our current chemical regime of living is not simply the result of new epistemological or technical innovations, but rather the accumulated result of some two hundred years of industrialized production, such as coal-based energy of the nineteenth century, or petroleum and plastic processing of the twentieth century. While recent decades have certainly seen new forms of production—such as those associated with electronic and digital devices—the most important recent shifts in this chemical regime of living have been the intensification of consumption combined with the geographical extension of industrialized consumption to more and more of the world's people, thereby accelerating the rates and variety of toxic pollutants released. Second, while synthetic molecular relations are clearly the result of activities which generate capital, they also tend to be “externalized” material effects of production and consumption practices—that is, effects that are purposively posited as existing outside the accountability of corporations, and in the context of neoliberal governments, outside the scope of regulation. Our chemical regime of living is characterized by the way it allows the fumes of

petrochemicals or the off-gassing of plastic commodities to be detectable but nonetheless irrelevant to corporate accountability. The costs—in lives and dollars—of externalized molecular relations are distributed into proximate, peripheral, or even distant landscapes. The anthropologist Sarah Lochlann Jain uses the term *commodity violence* to describe the kinds of injurious relations built into commodities for which producers are unaccountable.⁸ Such commodity violence is typically statistical, rather than specific, in kind: that is, it is externalized when only predictable as a statistical probability in aggregate, and not in specific individual—such as in the way breast cancer caused by pollution can happen to anyone, but not necessarily anyone in particular.⁹

Of course, the criterion of harmful molecular relations is not always externalized to production. When acknowledged, however, it tends to be posited as the acceptable contractual risks of laborers, or as the legitimate cost-beneficial risks to consumers. Despite the ubiquity of risk calculi, it is fair to say, (and many scholars have documented, including Allen and Nash here) that much effort has gone into obscuring, rather than revealing, 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.

Since there is a regime of imperceptibility that has been purposively assembled around synthetic molecular relations, efforts to render visible such relations—by scientists, by bureaucrats, by community groups, or by NGOs—are political acts.¹⁰ This chemical regime of living, then, is less about harnessing life to profit as in the bioeconomy, than it is about contestations over making legible the distributions of molecular harm and precarious life as effects of a complex political economy. For example, chemical harm concentrates in zones of dispossession, that is, zones in which life is rendered not just precarious to chemical effects, but also more disenfranchised and devalued in the larger political economy.¹¹ In the case of the Tar Sands and Fort Chipewyan, chemical exposures are built on histories of colonial dispossession. In other words, I want to attend to the history of a chemical regime of living in which the molecularization of life as an epistemologically contestable fact is interlinked with contestations over the physical production and distribution of chemical harm and dispossession.

The economic and epistemological aspects of the chemical regime I have so far sketched are joined by modes of governance that help to establish their condition of possibility. In the case of the Tar Sands, we might note that while chemical exposures are studied and contested more than ever before, Canada nonetheless overwhelmingly encourages the intensification of Tar Sands production in a neoliberal era in which the health of the economy tends to trump the health of ecosystems or human populations as a goal of national governance. Yet, at the same time, there has been a blossoming of nonstate grassroots efforts to render chemical exposures legible, regulatable, or preventable as an aspect of citizenship. The anthropologist Adriana Petryna has coined the term *biocitizenship* to name the ways people in the Ukraine took the condition of their

bodies relative to radiation as a point of entry into demanding entitlements from the state in the wake of the Chernobyl disaster.¹² Biocitizenship, then, is a useful term naming efforts that take life—from human bodies to ecosystems—as points of entry into making demands to the state, and thereby articulating the terms of citizenship via health and living-being. We can trace a century or more of biocitizenship projects responding to the effects of pollution on human well being. Since the 1970s in particular, scholars have tracked a history of such efforts, often by citizen-scientist alliances mobilizing mapping and survey techniques to render legible and politicize the effects of specific chemicals on communities. In the United States, the scholarship on environmental racism, on popular epidemiology in locations such as Love Canal, New York, Warren County, North Carolina, Woburn, Massachusetts, or in the chemical corridor of Louisiana, has charted the variety of places and projects that might fruitfully be grouped together as biocitizenship projects that took chemical exposure as an entry into renegotiating the terms of citizenship.¹³

Biocitizenship projects, by their very focus, tend to conjure a hopeful relation to the state—an optimism about the possibilities of pollution regulation, or about the state's commitment to health, product testing, safe food, and so on. Unfortunately, the story of the state's accountability to the new molecular relations of life has recently been largely a tale of deregulation and even subsidization, in which corporations, from tobacco to oil, have developed sophisticated tactics to obscure the chemical molecular relations of life, or to promote the kinds of risk calculi that legitimate the violent effects of production and consumption. All these features are at work in the case of the Tar Sands. Thus, increasingly multisited political economies of research and contestation have emerged.

Historically, the NGO has become the form that most engages and fosters biocitizenship projects. Yet, as the chemical violence of production is unevenly intensified in zones already shaped by other forms of dispossession (such as incinerators in minority neighborhoods, or workplace exposures for undocumented workers, or waste sent off-shore), biocitizenship projects that turn to the state are not available for noncitizens; for disenfranchised, illegal residents; for informal or illegal economic sectors; for communities across national borders; and so on. The question here is not whether biocitizenship projects, and NGOs more broadly, do a better job than the state does at monitoring chemical exposures (a low bar indeed), but instead in which ways these nonstate, nonprofit forms of governmentality are themselves constrained and productive in historically specific ways. Thus, nation-focused biocitizenship projects, as one dominant form of political grassroots tactic, have fostered new tactics of governing, researching, and contesting chemical exposure, while simultaneously reiterating a focus on nation that can sometimes obscure the transnational scale of political economy and leave unexamined contemporary forms of disenfranchisement.

As Daemmrich notes elsewhere in this forum (pp. 684-694), there has been a historical shift from what I am calling biocitizenship projects directed at the state to NGOs more directly confronting, or even collaborating with, the private sector,

calling attention to the plurality of kinds of NGOs, both over time and in place. Along with biocitizenship projects, then, we might also attend to what Partha Chatterjee has called the “politics of the governed,” a term he uses to describe the political, technical, and social strategies of dispossessed peoples, without access to formal mechanisms of citizenship, who seek to organize themselves into legible, governable, ethically charged communities amenable to the attentions of NGOs, development programs, or even the state.¹⁴ An example might be the spread of bucket sampling—a technique that uses plastic buckets to capture the evidence of transient, night-time, or other hard to prove pollution episodes developed by environmental justice activists in the Louisiana petroleum corridor—to communities in South Africa, India, Mexico, Canada, and other sites joined, not by a common nation-state, but rather by common conditions of dispossession created by mutual proximity to petrochemical processing.¹⁵ Ironically, bucket sampling turns the very products of the chemical industry—cheap plastic commodities—against them. Bucket sampling has traveled across national lines, facilitated by collaborations between the San Francisco-based NGO Global Community Monitoring and local “industrial communities” in diverse “chemical corridors” tied together, not by shared identity, but by shared proximity to multinational corporations. Tactically, the evidence collected from bucket sampling and the sharing of tactics across sites, has not led to national regulation, but instead to successful negotiations of local out-of-court settlements. Bucket sampling even links back to the Tar Sands, the oil of which is subsequently refined in Sarnia, Ontario. In both Sarnia and Alberta, it has been First Nation communities, already politicized in relation to colonial dispossession, that have initiated the resistance around which NGOs, including Global Community Monitoring, have rallied.

The particular technical practice of biomonitoring that allows us to list the diversity of synthetic chemicals accruing in ordinary humans has emerged, I would argue, within this larger chemical regime of life composed by molecularization, economic externalization, neoliberalism, diverse NGOs, and the tactics of ethically charged communities. Within this regime, biomonitoring can work on many levels. On the one hand, biomonitoring promises an individualized enumeration of chemical injury and risk resonant with visions of individualized genetics, holding open a promise of boutique medicine for the bourgeois risk-calculating subject exposed to chemical injury through consumption and the insidious spread of molecular relations even into the domains of relative privilege. On the other hand, biomonitoring can render legible the sheer abundance of synthetic molecular relations that make up human life and that exceed geographically bounded, racialized, or classed zones of dispossession.

Unfortunately, awareness of multiplicity is not inherently contestatory (as my own work on the history of Sick Building Syndrome has shown) because chemical, pesticide, and tobacco industries already have strategically encouraged awareness of the multiplicity of exposures, which subverts the ability to isolate the harmful effects of any specific exposure in an era when chemical exposures

are only regulatable and litigable as specific entities.¹⁶ All of this is further evidence of the claim that making synthetic molecular relations visible is a complexly political act.

Often when historians of science and the environment have studied toxic exposures, we tended to follow the chain from production to consumption in our attempts to show the violence wrought by industrial processes. The emergence of such techniques as biomonitoring and bucket sampling underline how, in this chemical regime of living, effects and injuries are not chained in this way. Molecular relations, as the Tar Sands show, not only move spatially across the earth on currents and winds, and not only spread transnationally through the proliferation and redistribution of industrial processes in global capital, but also are part of transnational conjunctures of militarism, activism, research, citizenship, and dispossession that exceed the chain metaphor.

In the Alberta Tar Sands, while the government has out-sourced monitoring of environmental exposures to the very industry that creates those exposures, environmental NGOs are working to create counterdocumentation of the process.¹⁷ Environmental Defence, for example, one of many Canadian NGOs concerned with the Tar Sands, has compiled a report of this “giant slow-motion oil spill” that extends the effects of the Tar Sands not only to Fort Chipewyan, but through pipelines to refineries in Louisiana and Sarnia, Ontario, Canada’s chemical corridor. Sarnia is home of the Aamjiwnaang First Nation, members of which have in turn used bucket sampling to document their exposure to endocrine-disrupting chemicals that may be linked to a decade-long halving of the number of boys born.¹⁸ Ironically, Environmental Defence also performed a national biomonitoring study called “Toxic Nation,” including not only the family of a Aamjiwnaang environmental activist, but also a handful of high-ranking politicians, who proved to have overall higher concentrations of tested chemicals than the citizen volunteers.¹⁹ Add to this conjuncture of NGOs, communities, and biomonitoring the activities of British Petroleum, one of the companies exploiting the Tar Sands, which is in turn protested both in its home country of Britain, but also in Whiting, Indiana, where it wants to expand refinery processing of tar sand oil. Air pollution from the Tar Sands is transforming into acid rain and blowing into neighboring Saskatchewan, while CO₂ emission, for extraction alone, makes the Tar Sands the largest source in Canada, contributing to global warming. We historians too are now part of this conjuncture, tracking molecular pathways that overflow the norms of social status and national borders, or even the time span of a human life. We too are struggling to find conceptual tools through which to capture this complex and uncertain set of phenomena. Instead of a chain, or a focus on bodies, the notion of a chemical regime of living might better provoke questions more adequate to the history of this entangled and enfolded political economy of molecular relations.

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NOTES

1. See, for example, To the Tar Sands (Sierra Youth Coalition Campaign); Oil Sands Truth; Oil Sands Watch (Pembina Institute); Tar Sands Watch (Polaris Institute); Indigenous Tar Sands Campaign
2. Nikolas Rose, "Molecular Biopolitics, Somatic Ethics and the Spirit of Biocapital," *Social Theory and Health* 5 (2007).
3. Sarah Franklin, *Dolly Mixtures* (Durham, NC: Duke University Press, 2006).
4. See also Carlos Novas and Nikolas Rose, "Genetic Risk and the Birth of the Somatic Individual," *Economy and Society* 29 (2000).
5. Bruce Braun, "Biopolitics and the Molecularization of Life," *Cultural Geographies* 14 (2007).
6. Collier and Lakoff develop a notion of "regime of living" as a "tentative and situated configuration of normative, technical, and political elements" in which "how to live is at stake," emphasizing in their definition the questions of ethics and kinds of reasoning. In this essay, my use of the term diverges from this definition in its emphasis on an assemblage of political economy, governmentality, and epistemology. Stephen Collier and Andrew Lakoff, "On Regimes of Living," in *Global Assemblages*, ed. Aihwa Ong and Stephen Collier (Oxford: Blackwell, 2004).
7. "Bioeconomy" is a term developed within the biotechnology industry sector, not by academicians. See Kean Birch, "The Neoliberal Underpinnings of the Bioeconomy: The Ideological Discourses and Practices of Economic Competitiveness," *Genetics, Society, and Policy* 2 (2006).
8. Sarah Lochlann Jain, *Commodity Violence* (Durham: Duke University Press, forthcoming).
9. Sarah Lochlann Jain, "Living in Prognosis: Toward an Elegiac Politics," *Representations* 98 (2007).
10. On regimes of imperceptibility, see Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Durham, NC: Duke University Press, 2006).
11. On the interrelationship between laborers considered disposable and distributions of legitimated violence, see Melissa Wright, *Disposable Women and Other Myths of Global Capitalism* (New York: Routledge, 2006).
12. Adriana Petryna, *Life Exposed: Biological Citizens after Chernobyl* (Princeton: Princeton University Press, 2002). The concept is also developed in Vinh-Kim Nguyen, "Antiretroviral Globalism, Biopolitics, and Therapeutic Citizenship," in *Global Assemblages*, ed. Aihwa Ong and Stephen Collier (Oxford: Blackwell, 2004); Nikolas Rose and Carlos Novas, "Biological Citizenship," in *Global Assemblages*, ed. Aihwa Ong and Stephen Collier (Oxford: Blackwell, 2004).
13. The literature here is large. See, for example, Barbara Allen, *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes* (Cambridge: MIT Press, 2003); Phil Brown and Edwin Mikkelsen, *No Safe Place: Toxic Waste Leukemia, and Community Action* (Berkeley and Los Angeles: University of California Press, 1997); Robert Bullard, "Anatomy of Environmental Racism and the Environmental Justice Movement," in *Confronting Environmental Racism: Voices from the Grassroots*, ed. Robert Bullard (Boston: South End Press, 1993), 15-39; Giovanna Di Chiro, "Living Is for Everyone: Border Crossings for Community Environment and Health," in *Landscapes of Exposure: Knowledge and Illness in Modern Environments*, ed. Gregg Mitman, Michelle Murphy, and Christopher Sellers, *Osiris* (Chicago: University of Chicago Press, 2004); and Eileen McGurty, *Transforming Environmentalism: Warren County, Pcb's and the Origins of Environmental Justice* (Rutgers University Press, 2007).

14. Partha Chatterjee, *The Politics of the Governed: Reflections on Popular Politics in Most of the World* (New York: Columbia University Press, 2006).
15. Importantly, activists have been able to negotiate acceptance of bucket air sample results by the U.S. EPA. See <http://www.labucketbrigade.org/index.shtml>.
16. Murphy, *Sick Building Syndrome*.
17. Christopher Hatch and Matt Price, "Canada's Toxic Tar Sands: The Most Destructive Project on Earth" (Toronto: Environmental Defence, 2008).
18. Constanze Mackenzie, Ada Lockridge, and Margaret Keith, "Declining Sex Ratio in a First Nation Community," *Environmental Health Perspectives* 113 (2005).
19. Environmental Defence, "Toxic Nation on Parliament Hill: A Report in Four Canadian Politicians" (Toronto: 2007).