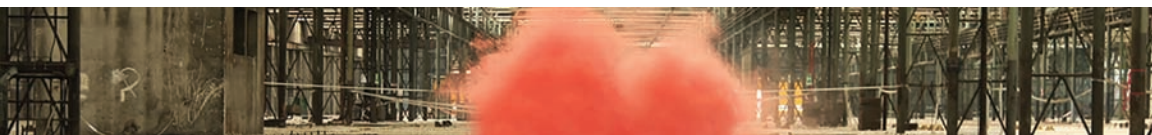


Openings and Retrospectives



CHEMO-ETHNOGRAPHY: An Introduction

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Chemicals have seeped into the ethnographic imaginary. Anthropologists have long been tracing the material, toxicological, and neurological valences of molecular dreamworlds, growing pharmaceutical markets, and landscapes haunted by industrial capitalism (e.g., Fortun 2001; Hayden 2003; Murphy 2006; Dumit 2012; Jain 2013). Sensing technologies and collaborations with allies in other disciplines are also allowing ethnographers to study chemical species in water, soil, air, human bodies, and emergent ecological assemblages. Theoretical and empirical research is focusing on technoscientific environmental constructs, civic public forms, noninnocent optimism, state abdication, and capital despoilment. Processes like sublimation and combustion are informing nascent approaches to writing culture in the Anthropocene (Shapiro 2015; Povinelli 2017). Chemicals are becoming increasingly useful linking figures as ethnographers follow complex, multisited, and multiscalar phenomena (Bond 2013; Hardon, Idrus, and Hymans 2013; Myers 2015; Romero et al. 2017; Sunder Rajan 2017; Murphy 2017).

Chemical ethnography, or *chemo-ethnography*, owes intellectual debts to [Lochlan Jain \(2013, 24\)](#), who has ushered “cancer and its identities out of the closet and into a space not of comfort, or righteous anger, but of mourning, a space where the material humanity of suffering and death informs communicative and collective action.” The stomach-wrenching experience of chemotherapy offers a suitably complex inroads to other encounters with the *pharmakon*—a poison that doubles as a cure ([Stengers 2011](#)). Scaling up Jain’s call for communicative and collective action, we are concerned with a broader suite of chemicals that create possibilities for life while simultaneously enfeebling bodies or multispecies worlds (cf. [Roberts 2010](#)). Chemo-ethnographers are starting to conduct research on economic, personal, political, and sentimental relationships that have emerged with modern chemistry (e.g., [Chen 2012](#); [Agard-Jones 2013](#); [Graeter 2017](#); [Feser, forthcoming](#)).

Departing from critical studies of carcinogenic toxics and biomedical cures, this collection also considers chemical relations in more-than-human realms. Anthropologists are starting to characterize corrosive atmospheres and the play of enzymes, affects, and reagents in ecological assemblages ([Landecker and Panofsky 2013](#); [Myers 2015](#); [Povinelli 2016](#)). Age-old philosophical questions—“what is life?” and “what is not life?”—melt into each other as some consider “life that becomes not-life, an other-than-life, a becoming-nonliving” ([Thacker 2005](#)). Celebrating the liveliness and agency of all matter, [Jane Bennett \(2010\)](#) has insisted on flattening distinctions between things like a dead rat, oak pollen, a plastic glove, and a bottle cap. Responding to this animist exuberance, [Elizabeth Povinelli \(2016, 55\)](#) asks: “Are we simultaneously extending the qualities and dynamics of one form that we believe existence takes (Life) onto the qualities and dynamics of all forms of existence?” Writing in the same critical vein, [Sebastian Abrahamsson and colleagues](#) insist that ethnographers move beyond enthusiasm “about the liveliness of ‘matter itself,’” and instead attend to “the complexities, frictions, intractabilities, and conundrums of ‘matter in relation’” ([Abrahamsson et al. 2015, 13](#)). Building on this conversation, we ask: how are molecular frictions, catalytic dynamics, forms of not-Life, and other-than-life reconfiguring our conditions of knowing, being, and sociality?

Thinking chemically—channeling attention to nonliving entities through the instruments and rubrics of science—involves not just explanatory promises but also perils. Chemo-ethnographers are studying how initiatives to monitor water quality or to bioprospect for pharmaceuticals have displaced other pressing community concerns and limited conversations to the priorities of scientists, policy

makers, and corporations (cf. [Hayden 2003](#); [Bond 2013](#)). Allies in fields like geography and cultural studies have noted that chemical technologies have the propensity to foreclose imaginative horizons and structure discourses about “what revolutions are realistic, what upheavals of social and moral order are inevitable, and thus what moral anxieties do or do not warrant engagement” ([Hurlbut 2016](#), 226). This collection of essays critically considers the slippages that occur when we focus on the molecular register and clamber toward new techniques for making knowledge that risk reinforcing age-old sociomaterial fault lines.

TOXIC METHODOLOGY AND CHEMOSOCIALITY

Anthropologists have been experimenting with hallucinogens and other mind-altering drugs since the late nineteenth century, when [James Mooney \(1896\)](#) and [Carl Lumholtz \(1903\)](#) studied peyote rituals as participant-observers. The counterculture of the 1960s produced a generation of anthropologists who took drugs for different reasons. “Sharing a widespread discontent with their own culture,” they conducted ethnobotanical research and took hallucinogens to explore “better ways of life” ([Langlitz 2012](#), 12). But privileged hallucinatory visions became entangled with the War on Drugs, which had catastrophic consequences for Indigenous groups and structurally marginalized communities across the Americas. Local death squads began hunting down and killing suspected cartel members in Colombia, while Wall Street brokers sniffed cocaine in the men’s room and U.S. politicians supported covert violence against cocoa-leaf farmers and black communities in the United States ([Taussig 2004](#), 16).

While some seek out chemical encounters to alter their sensoria, others cannot escape such encounters. For example, the queer theorist [Mel Chen \(2012, 201\)](#) experiences altered states of “cognition, proprioception, emotion, agitation, muscle strength, tunnel perception, joint pain, and nocturnality” as a result of chronic or even ephemeral chemical exposures. Physicians have medicalized Chen’s condition—labeling it “heavy metal poisoning” or “multiple chemical sensitivity.” Departing from these labels, Chen uses their altered state of being as a starting point for a toxic methodology. This subjectivity has become an opportunity for them to consider what toxic exposure “offers to thinking about bodies and affect” ([Chen 2012](#), 197). [Chen’s \(2012, 203–205\)](#) toxic methodology involves an “unworlding” where the “normal” world’s order is lost as neurotoxins “inhibit enzymes, disrupt cell membranes, damage structural proteins, and affect the genetic code in nucleic acids”. Other starting points for toxic methods include the lived experiences of pharmaceutical personhood by chronic patients ([Jenkins](#)

2011; Dumit 2012; Kenner 2013) and the queer diffractions of sensations experienced by transgender subjects on hormones (Hayward 2012). Medicines and toxic exposures often produce shifting senses of normality, or intoxication, which means that one is “impaired, yes, but also released from responsibility in particular ways that can be both dangerous and pleasurable” (Pollock 2016, 185).

Rather than simply celebrating the liberatory potential of intoxicating drugs or starting from privileged access to an altered sensorium, our own toxic methodology is grounded in nearly a decade of research on how standard methods of detoxifying the atmosphere also sustain infrastructures of toxic exposure (Shapiro, Zakariya, and Roberts 2017). Our approach to chemo-ethnography also comes from personal experiences of caring for loved ones with cancer, whose bodies and subjectivities have been remade by the haunting specters of radioactive elements and then shocked with poisonous cures (see Kirksey 2017). Chemo-ethnographers need not live with the experience of cognitive, corporeal, or landscape transformation, or the labor of maintaining safe chemical equilibriums. Instead, ethnographers might think with care about *chemosociality*—the longstanding relationships and emergent social forms that arise from chemical exposures and dependencies.

Ethnographers are living in chemosocial worlds, as both participants and observers. If biosociality involves social relationships that emerge from biological conditions and the science and technology through which they are known (Rabinow 1996), then chemosociality involves novel, altered, attenuated, or augmented relationships that emerge from shared and shifting chemical ecologies. Chemosocial phenomena and biosocial communities are often intimately entangled. Such is the case when chemical exposures generate cancerous tumors. Biosocial communities emerge as cancer patients jump through hoops together to access chemotherapy and “share an experience that has potentially identity transformative effects” (Jain 2013, 31). Political communities are emerging from shared chemical infrastructures—as in Flint, Michigan, where lead persists in municipal water systems (Fennell 2016), and in rural Bangladesh, where naturally occurring arsenic in rural wells remains due to colonial scientific and national government neglect (Ahmed 2014).

Chemosocial communities can form around shared pleasure, rather than shared suffering. When one decides to give oneself over to the ecstatic abandon of methamphetamines and other recreational drugs, solipsistic spaces often open shared bubbles of reverberating affect (Pine 2016, 310). Once upon a time, HIV-positive gay men formed biosocial kin networks by barebacking without con-

doms—creating communities that valued pleasure above health (Dean 2009). Queer chemosocial worlds have more recently emerged with PrEP—a daily prophylactic pill that prevents HIV infection and enables novel safe-sex practices. Those who take a daily dose of PrEP to stay virus-free are forming promiscuous chemosocial communities—where inclusion comes with a prescription. Chemosocial PrEP communities sometimes overlap with the biosocial communities of HIV-positive people (Holt et al. 2017). PrEP is perhaps a queer echo of the birth-control pill that enabled women to experiment with new modes of sociality and sexuality in the twentieth century. Emergency contraceptive pills, generic Viagra, cosmetics, and tonics have been exported from the United States and Europe to enable promiscuous chemosocial sexualities in places like Ethiopia, Indonesia, the Philippines, and West Papua (Hardon, Idrus, and Hyman 2013; see also Hardon and the Chemical Youth Collective 2017).

More than just being another tool for understanding the mediation of social relations among people, chemosocial forms also involve relationships with human-built infrastructures. The form of the social in chemosociality includes the mass patterning of human life by chemicals that need not coalesce into a social movement (Shapiro 2015; Zee 2017). “Con-spiring,” or breathing chemicals together, produces chemosocial solidarities in plumes of pesticides sprayed on agricultural fields or larger atmospheric “unequally shared milieu(s)” (Choy 2016). While studying chemosocial phenomena, ethnographers are attending to relative vulnerability and privilege with respect to countervailing norms and values, to practices of inclusion/exclusion, and to the play of affect within shared spaces of pleasure. Ethnographers are also starting to venture beyond strictly anthropocentric concerns to develop new tools for chemical sensing in more-than-human worlds.

TACTICS: Sensing Chemical Species

Some chemo-ethnographers are drawing inspiration from the 1990s tactical media movement in the arts. Manifestos like “The ABC of Tactical Media” (Garcia and Lovink 1997) described the generative capacity of “cheap ‘do it yourself’ media, made possible by the revolution in consumer electronics.” Culture workers in the tactical media movement gained renown for making creative and rebellious uses of texts and ready-made artifacts (cf. de Certeau 1984). Experiments in the realm of “tactical biopolitics” (da Costa and Philip 2008) influenced an earlier moment in anthropology, when ethnographers started to make aesthetic interventions in the realm of multispecies studies. Chemo-ethnographers are departing from insights gained in an aesthetic register and are starting to use diverse ap-

paratases for apprehending and redirecting political, economic, technical, and industrial systems.

Critiques of science and technology's many exclusions have been folded into generative design practices and civic technoscience initiatives focused on creating accessible instrumentation (Wylie et al. 2014). Public Lab, a collective of community-oriented scientists and hobbyists in the United States, has developed low-cost and open-licensed chemical test kits. Collaborating with people suffering from chronic chemical exposures, as well as with chemists and engineers associated with Public Lab, Nicholas Shapiro helped design affordable formaldehyde-sensing and remediation kits. One sensing kit measures formaldehyde (CH_2O) concentrations and other similar chemicals ($\text{C}_3\text{H}_6\text{O}$ and $\text{C}_2\text{H}_4\text{O}$) that interact with the sensor in indistinguishable ways. If this sensor produces epistemologically cloudy results, the remediation kit produces clear changes in ontological states. The remediation device scrubs the air of each of these molecularly similar toxics without regard to particular species.

The species concept is used by chemists to denote identical molecular entities. In contrast to biological species, which are relatively stable (see Kirksey 2015), chemical species may quickly change state. Molecules can quickly degrade, react with other substances, and reform. Taking an elementary example, the species-being of salt molecules (NaCl) splits into two other species in water—free sodium and chloride ions (Na^+ and Cl^-)—only to again become the original species, NaCl , if the water evaporates. At the other extreme, chemical elements like Bismuth-209 endure for timescales that are difficult for humans to understand—undergoing alpha decay over a period that is more than a billion times longer than the universe is estimated to have existed. Chemical species should not just be considered in relation to life. Considering the full spectrum of dynamics among chemical species—processes of persistence, decay, ionization, combustion, and sublimation, to name a few—requires moving beyond the bios/thanatos divide and gazing into the realm of nonlife. Instead of stabilizing molecules in the known world, chemo-ethnographers have the opportunity to work within and around factishes and even to catch glimpses of the cosmopolitical beyond. “The cosmos refers to the unknown constituted by multiple divergent worlds,” writes Isabelle Stengers (2005, 995), “and to the articulations of which they could eventually be capable.”

Mass spectrometers, which ionize individual molecules and determine the mass of its constitutive parts, are the standard inscription devices that help researchers grasp chemical species against the backdrop of the unknown (Latour



Figure 1. The isotope Bismuth-209 has a half-life of more than one billion times longer than the current age of the universe. Photo courtesy of Ken Keray.

and Woolgar 1979, 242). Spectrometers are too expensive for most hobbyists and ethnographers, even if *Science* magazine celebrated the moment when the price tag on entry-level mass spectrometers became “less than a Lamborghini” (Dove 2008, 1116). Some cultural anthropologists are eschewing the instruments that shape knowledge in the realm of Big Science, working instead to build their own, more accessible inscription devices that produce knowledge with arduino circuit boards, nine-volt batteries, color LEDs, and \$7 gas sensors available from Amazon. As chemo-ethnographers expand the conventional anthropological toolkit, many are joining other *bricoleurs*, tinkerers, and thinkers in not only describing the world as it is but also in imagining alter-worlds as they might be (Shapiro, Zakariya, and Roberts 2017; cf. Ingold 2013).

Working to make imperceptible chemical traces perceptible—doing careful articulation work within hegemonic political, economic, and epistemological structures—ethnographers are starting to acquire new skills. But, rather than rushing to incorporate new techniques into chemo-ethnographic research practices, it is worth reflecting on how these technical devices risk reproducing structured social and racial inequalities (Chen 2012, 162). An emergent market for do-it-yourself chemical sensors is capitalizing on the presence of indeterminate toxic threats. The epistemological affordances of sensors risk reinforcing the dominance of science in society and promoting the modernist dream of the imminent calculability and knowability of the material world. Sensing technologies can be deployed to produce “historically specific terrains of invisibility” or “regimes of imperceptibility” (Murphy 2006, 267, 274), since toxicological experts know how to tinker with humidity levels, animal models, and device types to support pre-ordained conclusions. Even so, studying industrial systems with chemical-sensing technologies could give ethnographers an ability to make slow violence visible—working with and against technologies of power that produce an “explosive mix of hope and servitude” (Nixon 2011, 87).

REFIGURING CHEMOSOCIALITIES

Turning away from spectacular images of nonlife, the authors in this collection are working against dominant trends threatening contemporary lifeworlds—deploying sensing and mapping tools in antiracist struggles, making environmental knowledge in coalition with Indigenous peoples, and defending life-giving waters from the strangulating infrastructure of petrochemical pipelines and the atmoterror of chemical weapons (Povinelli 2016; Simmons 2017; cf. Sloterdijk 2009).¹ Anthropologists have long challenged the “unselfconscious parochialism” of environmentalism in the United States that has developed “de facto, as an offshoot of American studies” (Nixon 2011, 234, 235). This collection *can* be read as an intervention in American studies, since the United States has been an important historical experimenting ground for industrial chemistry (across petrochemistry, pharmaceuticals, and agribusiness). Yet the authors in this collection are also doing imaginative labor beyond the confines of national borders—tracing chemical species through global assemblages to describe sprawling lines of relation that are producing both discomfiting and liberating modes of chemosociality (Murphy 2017; see also Agard-Jones 2013; Hardon, Idrus, and Hymans 2013).

Ethnographers who worked in an era before sensing devices formed part of the ethnographer’s toolkit have long explored precarious lifeworlds in the shadows

of U.S. chemical empires. [Kim Fortun's \(2001, 134\)](#) careful study of the Bhopal disaster at a Union Carbide pesticide plant in India scrutinized the architecture of chemical infrastructures, tracing molecules through “every flow path, linkage, and barrier” in the piping configurations of the plant. Union Carbide’s managerial neglect and incompetence indirectly killed at least 2,259 people. Despite this carnage, [Fortun \(2012, 446\)](#) has subsequently observed that “understanding of the chemicals released in Bhopal remains inconclusive” some thirty years after that fateful explosion. Synthetic chemistry continues to fuel settler-colonial legacies, patterns of dispossession through pollution, and imperial projects that have compromised sovereign spaces throughout the modern world-system ([Auyero and Swistun 2009](#); [Agard-Jones 2013](#)). Evil infrastructures continue to proliferate (see [Kelty 2017](#)).

Chemo-ethnographers, who have taken up the task of writing culture in the era of late industrialism, are grappling with the predictability of capital and power, while holding on to subtle hopes that the lateness of this age is also the earliness of something radically different (cf. [Fortun 2012](#)). While looming sand clouds in north-central China prefigure an ever-immanent end ([Zee 2017](#)), Senegalese toxicologists long for the capital and capacity to once again practice their craft in an imagined future that is always just beyond the postcolonial horizon ([Tousignant 2013](#)). The success of environmentalism in Europe and North America has led to the export of industries connected to toxic extraction and disposal to places like Botswana, where cancer wards are reserved for the postcolonial elite who alone can afford to treat the ills of development capitalism ([Livingston 2012](#)). In Peruvian mines, toxicological monitoring and remediation projects necessitated the integration of Catholic and secular scientific practices, where believers hope to move beyond godless occidental science ([Graeter 2017](#)).

Stepping back from the strange allure of apocalyptic nightmares and wild dreams of technoscientific salvation, ethnographers are starting to describe modest hopes emerging with new chemo-social identities. Chemical exposures are catalyzing intersectional political projects. Chemosocial relationships are transforming conceptions of the self, forging new virtual and place-based communities, and fueling reform and counterhegemonic social movements. Ethnographers who do not claim membership in chemosocial groups are engaging in descriptive work with tact and care—cherishing bodies and subjectivities that have been remade by the haunting specters of industrial pollutants and then shocked with poisonous cures (see [Kirksey 2017](#)). While living in conditions that have become inextricably linked to toxic materials and industrial chemical enterprises, chemo-ethnographers are joining with interlocutors in speculation. Departing from thick descriptions

of what life *is* like in compromised times, chemo-ethnographers are speculating on “what life *might* or *could* be like” (Ingold 2013, 4) if technologies of power were to open up alternative explosive possibilities.

NOTES

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1. The history of twentieth-century terror, according to Peter Sloterdijk (2009, 34), reveals that nation-states “were the first to have recourse to terrorist methods and means.” With the gas attacks of World War I, modern chemical war began targeting the atmosphere of the enemy. Atmoterrorism began turning the environment of the enemy into a weapon against them. Gas chambers in U.S. prisons and Nazi concentration camps brought this terrorism of the air to individuals and populations. In situations of atmoterror, “living organisms, among them humans, simply cannot breathe” (Sloterdijk 2009, 41). States continue to use the tactics of atmoterrorism for suppressing racial and Indigenous justice movements (Simmons 2017), while industrial infrastructures create distributed chemosocial situations in which organisms anxiously share the experience of not being able to properly breathe (Choy 2016).

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