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## Commentary: Causal Enclosures—Over and Over

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With despondency, but little surprise, it seems that the pessimists were probably right. When epigenetics, the microbiome, and the Developmental Origins of Health and Disease seemed poised to replace narrow genetic determinism, some social scientists were hopeful that more of the world's dynamic complexity would be included in life scientists' models of how we come to be over time. But as several critical social scientists warned, post-genomic models, which could have been inclusive of more relations, could not overcome the long-standing reductionism of the life-sciences (Lock 2013; Mansfield 2012; Niewohner 2011; Paxson and Helmreich 2014). When life scientists look for *cause* in tiny bio-markers, cause stays small, even if cause can come from the environment and pass across generations. And perhaps, even more than with genetics, post-genomics finds cause in the circumscribed environment of the mother/child dyad, making it even easier to overlook an increasingly devastated world.

Staying with small cause is constitutional to the life sciences within capitalism. Critical feminist scholars, theorists from the Global South, Native North Americans, and anti-racist researchers and activists have laid out *ad nauseum* how nascent capitalist economic practice and modern state-craft enclosed land and bodies, especially female bodies, making both land and body available for the taking, managing, and controlling, precisely through their separation (Federici 2004; Feely-Harnick 2014; Ginsburg and Rapp 1995; Hoover, 2017, Keller 2010; Kimmerer 2015; King 2019). Post-genomic models and practices, like epigenetics that promised to let more of the world in, can only do so within these enclosures. The authors of the articles in this timely and important special issue of *Medical Anthropology Quarterly*, "Towards Intergenerational Ethnography: Kinship, Cohorts and Environments Research," demonstrate that post-genomic life sciences keep making these enclosures afresh. The special issue authors take emergent scientific approaches to intergenerationality as their object of study, and find that even with this expansion, experts can only reduce. As Kasia Tolwinski, cited in this issue, tells us, post-genomic life scientists "always include the preface that changes must be made at a structural level, even as it is recommended that interventions must target the individual, molecular level" (Tolwinski 2019: 157). By investigating shit, methylation markers, and brains through linear and vertical kinship models, life scientists can only keep cause small. I think of this as "causal enclosure."

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While reading these articles, I was struck by how, although social scientists can tell nuanced histories of the varied trajectories of scientific cause and effect embedded in the research programs and practices of region, nation, and discipline (Hartigan 2013; Meloni 2014; Stepan 1991), we are forced to be depressingly one-note when it comes to our analysis of what most contemporary life scientists actually do. All we *can* do it seems, is document again and again what life scientists leave out as they seek cause. This collection of papers, all substantial, well-argued, with careful depictions of often painful kin relations, nearly all document how even when life scientists add an intergenerational framework, cause remains cordoned off from land, history, and larger processes of dispossession. Causal enclosures, over and over.

I could spend substantial space here parsing how these authors have accumulated more evidence for the reductionism of contemporary bio-scientific practice, but I have little enthusiasm for describing yet again how the life sciences corral mother/child dyads into constricted enclosures for study. Instead, I want to reflect on how several of these articles provide glimpses of an otherwise to the causal enclosure of the life sciences. These glimpses make it easier for me to apprehend how these life scientists are just as embedded in specific ecologies as any of their study subjects. In four of the six articles, we find ordinary people organizing themselves through capacious sets of relations over time and space, even as they participate in reductive life-science research. Through their participation, these ordinary people obtain resources, like money and meaning, while seeming mostly indifferent to the life scientists' presumption of causal enclosure. Seeds, shit, and brains exceed individuals and mother-child dyads, in dynamic relation with the world they inhabit and that grew them. These non-scientists don't necessarily critique the life scientists or their research, but they have the capacity to keep all kinds of temporal and substantive relations at play inside and outside of biological bodies. Brains, shit, and seeds contain multitudes.

Stephanie Lloyd's and Alexandre Larivée's article, "Shared Relations: Trauma and Kinship in the Afterlife of Death" explores the brains of those who committed suicide. We learn that while researchers in Quebec limit their focus to the brains of those who died by suicide, relatives keep their loved one's brain embedded in the world's damaged relations. The relatives' participation in the scientist's post-mortem analysis is a means to accompany their family member's brain after death. Surviving kin maintain their relationships with the departed, post-mortem, "always anchored in interpersonal trajectories and environments imbued with the residues of relations that leave everyone involved marked. These relationships are reciprocal, unfinished, and unending" ([page # to be added]). Despite the scientists' narrow focus on cerebrums, their study provides meaning that can be reabsorbed into the lives of the living through care for their loved ones beyond death.

In "Microbial Kin: Relationships of Body, Environment, and Time," Amber Benzra describes traveling to Dhaka, Bangladesh, to understand where the shit and microbes come from that U.S.-based microbiome scientists study. These scientists focus on mother/child feeding as the cause of diarrhea, to understand the relationship of malnutrition to the microbiome but with little capacity for examining the causes of malnutrition that makes diarrhea so ordinary in the first place. In Dhaka, Benzra spends time with women recruited as mothers who seem practiced in the ways of study participation. Handing over their family's shit provides them some

means to maintain their collective family life. They might not experience shit as kin, but their shit has become a resource for keeping their kin alive.

In “The Politics of Trauma: Gender, Futurity and Violence Prevention in South Africa,” Michelle Pentecost documents how in Khayelitsha, a township located within Cape Town, South Africa, authorities keep violence small, by locating its source in traumas passed from Black mothers to Black boys. Judges and legal theorists use the first 1,000 days of life to link violence to epigenetic methylation markers, which molecularizes trauma. This causal enclosure permits authorities to call for more policing. Meanwhile, the first 1,000 days of life means little to women in Kayelitsha as they grapple with apartheid legacies of infrastructural violence that leaves them vulnerable as they navigate their daily commutes. It also means little to these women when they must live with the violence begat in their boy children by state abandonment that makes it clear that the nation cares nothing for them.

There is much more of a glimpse of an otherwise to causal enclosure in Katie Dow’s article, “Bloody Marvels: In Situ Seed-saving and Intergenerational Malleability,” the only article in this collection unpopulated by scientists. Among seed savers in London, Dow finds an explicit resistance to the enclosed individuality of being assumed by life scientists. The seed savers are concerned with their relationships with seeds and fellow seed savers, “and, with that, their inherent malleability and inherently malleable inheritance” ([page # to be added]). When seed savers, as non-scientists, are not bound by the funding mechanisms that demand causal enclosure, seeds, places, and people can permeate each other.

In Janelle Lamoureux’s article, “Passing down Pollution: (Inter)generational Toxicology and (Epi)genetic Environmental Health,” she describes a research lab in Nanjing, China, where enclosure models are decentered and bodily permeation becomes more than a glimpse. The Chinese state has the capacity to organize population into a collective instead of individuals, allowing sperm researchers to examine the outsides that get into bodies. These state-approved models provide a pathway for researchers to then examine how environmental toxicity can damage sperm. Despite adding in more of the world, reduction persists however, as only certain relations are permissible. Environmental toxicity can only be linked to one effect; threats to the collective heterosexual future. Overcoming capitalist enclosures does not necessarily allow for a proliferation of non-patriarchal relations.

In one of these articles, there are no glimpses of an outside to casual enclosure. Martine Lappé and Robbin Jeffries Hein’s article, “You Are what Your Mother Endured: Intergenerational Epigenetics, Caregiving, and the Temporal Embedding of Adversity in Early Life,” analyzes the discourse of epigenetic scientists based in Canada and the United States who temporally embed children’s trauma in discrete moments within a mother’s experience and early life, ignoring the unequal world that mothers inhabited. These scientists’ epistemic models place adversity, trauma, racism, and poverty inside a short temporal period and a narrow set of relationships, making it impossible to imagine any outside to causal enclosure. As Lappé and Hein demonstrate, life scientists make mothers responsible for their own exposures and thus they are the cause of intergenerational damage to their offspring, not long-term inequality.

Taken together, these articles do an excellent job delineating the causal enclosures of contemporary life scientists that perhaps are reinforced by their recent embrace of

intergenerational frameworks. These scholars also provide us with hints of an otherwise, which made me long for a few more tools for understanding how an otherwise might be achieved. When describing the non-scientists, these ethnographers tended to locate non-scientists in fuller, less enclosed, ecologies to help us make sense of their current conditions. I would have liked to see these ethnographers extend that kind of analysis to researchers and other experts. By situating researchers in more expansive intergenerational ecologies, we might understand how reductive enclosures are constantly reproduced and remain so powerful. With a more ecological exploration of scientists' and authorities' habitats, we might be able to apprehend how causal enclosure is not just produced through epistemic models, scientific discourse or cultural beliefs, but through long term accretions of funding mechanisms, social welfare provisioning, mathematical models, the capacities and constraints of data collection, and disciplinary reward. By examining these ecologies more closely, we might find that researchers embedded in capitalist life sciences cannot locate cause in more than enclosed mother/child dyads, and that for reproductive toxicologists in China, only patriarchy can be propagated.

I find it heartening that several of these authors are also involved in efforts with life scientists to do life science differently (De Wolfe et al. 2021; Gibbon and Mathers 2021; Pentecost 2021, see also <https://bbcrnetwork.com/>). These authors' emergent collaborations with life scientists attempt to dislodge enclosures by bringing airs, waters, places, dispossessions, wars, inequality, and devastating public polices into causal models. Collaborations like these are as essential as they are slow, halting, and extremely challenging. Critical social scientists have enormous resources for making connections between land and body, but as those of us attempting to collaborate have found, making these connections is extraordinarily difficult when causal enclosure is so baked into the life sciences.

In my collaborations with environmental health scientists conducting a longitudinal chemical exposure study in Mexico City focused on mother-child dyads, I have found that while, in theory, researchers can be receptive to imagining letting more of the world in, causal enclosure is profoundly entrenched (Roberts 2021b). For these scientists, mother/child dyads are the environment, which precludes including vast transformations in the chemical, legal, and health care landscapes of post-NAFTA Mexico City. Their methods of data collection and statistical analysis have no capacity to apprehend how, for instance, post-NAFTA, corporate deregulation and corporate health philanthropy ensure that causes of diabetes's massive death count are only linked to individuals (Vasquez 2020). Thus, my collaborators can only understand blood sugar levels and methylation markers as enclosed in the biologies and behaviors of the mothers and children they study. In the meantime, I try to give these researchers more than glimpses of how their study participants grapple with a much wider set of relations for understanding the long-term environmental causes of their current conditions. There is very little toehold, however, for these more expansive relations to land in researcher's current practice.

When I sought this collaboration, I was one of those hopeful social scientists who imagined that together, ethnography and epigenetics could let more of the outside in. Now, after a nearly a decade, I have found that causal enclosures are more entrenched in life science research than I ever dreamed. At the same time, I can see that resistance does not lie primarily in life scientists' words and thoughts. Through

the slow, difficult process of collaboration, especially with younger researchers, where we ask different kinds of questions, I can apprehend a little better how we might collaboratively make some cracks in the armature of causal enclosure (Jansen et al. 2020; Leighton and Roberts 2020). It is also apparent that for dismantling causal enclosure, we also need a full-frontal assault on racialized capitalism through movements like Black Lives Matter, and supra-national demands for vaccine equity in response to global inequities laid even more bare by the Covid-19 pandemic.

So “yes” to critique of post-genomic research that has expanded across generations while keeping cause small. Through collections like these, we can keep reminding ourselves of the pernicious effects of the gaps inherent to causal enclosure. But please, let’s do more to understand both where those gaps come from and how our repeated critiques won’t make them go away (Roberts 2021a) Even if we don’t inhabit ecologies rich in resources for collaboration with life scientists, and very few of us do, we can still use ethnography to document what keeps causal enclosures so firmly in place despite including intergenerational frameworks. We must apprehend the ecology of casual enclosure then, if we want the life sciences to be done differently, which will allow us to move toward more powerful understandings of how we come to be through time and place (Benjamin 2019; Graeber and Wengrow 2021).

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