Genetic Hygiene:
Discourses of Causation in North American Medicine

by

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Abstract

Written in an era that is witnessing an epistemic shift through which human health is increasingly being geneticized by North American science and medical institutions, this dissertation interrogates the discourses that make such a shift—and all of its material repercussions—possible. I contend that the naturalization of reductive and mono-contextual discourses of causation have acted as conceptual precursors to the epistemic dominance now secured by genomic and "personalized" medicine in 2015. Reading these discourses of causation as part of a larger hegemonic set of processes that find expression as a liberal form of self-management in the context of Canada as a state that invests in the productive capacities of its citizenry, this thesis narrates the development of reductive causation through three case studies that examine how state institutions have parsed forms of social inequality from forms of biological inequality, while epistemologically cementing the latter as the scientific mechanism of causation. Ultimately, this thesis aims to disrupt the hegemony of these discourses to create space for other knowledges concerning health and illness, including that of Indigenous Traditional Knowledge.

I contend that the state's parsing of social and biological forms of inequality is informed by a notion of biovalue—a concept developed by Catherine Waldby and Robert Mitchell to theorize a biologically novel form of value produced by innovations in molecular biology. But, for the purposes of my analysis, I situate biovalue on a macro scale that I argue is particular to a neoliberal state that retains social-democratic features such as social security and universal health care, and the ways in which economic considerations of such a state have led to institutions and policies that distribute resources based on calculations of *gradients of biovalue*. Biovalue measures capacity for productivity, and yet longstanding biological and political notions of variation and inequality, such as eugenic ideas concerning varying capacities for productivity along race and class divides, continue to inform state policy.

The first chapter presents an early articulation of personal hygiene being framed as a form of self-management into which individuals—especially those living in poverty—are hailed as hygienic subjects, which is, in the interwar period, synonymous with responsible, self-determinate subjectivity. This chapter traces how the eugenic ideas and policies of the Canadian physician and policymaker Helen MacMurchy betray a calculation of biovalue that explicitly takes into account the perceived "drain" on state resources presented by unproductive citizens in the period preceding the implementation of universal health care following the passing of the Medical Care Act in 1966.

The second chapter turns to a particular application of genomic science in the form of the development of pharmacogenetic drugs that divide therapeutic populations on the basis of race. This chapter draws attention to the multiple sites of power and knowledge production that have an interest in figuring race as a biological entity that "naturally" determines differential forms of biovalue, and the way in which science has been positioned as the preferred channel through which this knowledge is disseminated. In addition to revealing the extent to which science and the state are intertwined in their production of race as a form of valuation, this chapter notes how articulations of urgency accompany the shift into therapeutic applications, functioning as a political justification for intervention while eliding their centrality to modern racial projects.

The third chapter considers how state calculations of biovalue in Indigenous communities in Canada have informed the development of two-tier public health in

Canada in the form of race-targeted public health campaigns. Through an analysis of government policy, this chapter finds that these public health campaigns betray a persistent colonial attitude towards, and devaluation of, Indigenous lives—indirectly, through policy—and that in this sense, these public health campaigns can be understood as a logical extension of the colonial project that was at work in the Canadian government's Indian Residential Schools.

The overarching aim of this project is to bring to the forefront the multiple ways in which dominant discourses of causation prevent the development of new imaginaries, and keep us from asking critical questions beyond the reductive thinking produced by our current epistemological, technological, and funding infrastructures.

Preface

This thesis is an original work by Sarah Blacker.

Chapter Two of this dissertation includes a revised and expanded version of my published article "Epistemic Trafficking: On the Concept of Race-Specific Medicine."

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Chapter Three of this dissertation includes a revised and expanded version of my published article "'Your DNA Doesn't Need to Be Your Destiny': Colonialism, Public Health and the Financialization of Medicine."

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Introduction: “Promises Past and Present”

> It appears that feeling healthy has become a sign that you need to be careful and go in for a screening. To be normal, therefore, is to be insecure… Paradoxically, the insecurity continues to grow despite there being an equal growth in research about risks, screening, and treatments and constant growth in the amount of medicine consumed each year—as if the more we knew, the more we fear; and the more we fear, the more preventive actions and medications we need to take. (Dumit *Drugs for Life* 1-2)

At the outset of the twenty-first century, the category of health for the white, middle/upper class in Canada and the United States has become synonymous not only with an absence of disease, but also an adherence to a set of practices of self-maintenance and prevention of future disease that include exercise, sunscreen, vitamins, and supplements. A number of companies that comprise the burgeoning health industry have spun this set of cultural fixations and taboos through the development of products that play on our fears of disease as well as our hopes of transcending, enhancing, and optimizing our individual potential. The cultural proscription against behaviours that are seen to increase the risk of developing disease is strongly enforced—not only through the implementation of policies that discourage practices like smoking cigarettes, but through the development of a self-policing culture in which medical risk circulates as a set of “dangerous” behaviours.[1] For this the white, middle/upper class elite, to *know* of the medical risks that may arise from a Vitamin D deficiency without acting upon this knowledge is no longer seen only as a failure to “optimize” one’s health, but is equated with a deliberate placing of one’s self at risk. As Dumit contends: “to not worry about your health, to not know as much as you can about it, and to not act on that knowledge is to be irresponsible” (*Drugs for Life* 1). It is this fear and insecurity surrounding health and the possible sudden

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[1] See, for instance, Michelle Stewart’s work on Fetal Alcohol Syndrome and the criminalization of mothers.

onset of disease that provides the epistemic space within which discourses of causation do their work.

Discourses of causation work together with the episteme of technoliberalism as flexible and decisive arbiters of individual behaviour, producing verdicts concerning the morality and responsibility exercised by the individual in relation to their health status. These discourses are flexible enough to be molded to suit the political context of the moment, and in so doing they direct the pendulum of causation closer to either genetic or environmental causation, depending upon the circumstances. The flexibility and imprecision that characterize discourses of causation render these discourses particularly appealing to eugenicists and social engineers of all kinds, as they provide a rhetorical medium through which radical shifts in valuation and policy, as well as acts of discrimination, can appear as seamless and thus be naturalized.

Governed by discourses of causation, the concept of health interpellates subjects as risk-managers and promotes a normative and moral injunction towards a narrow sense of health that devalues and pronounces as inferior many different ways of being, including those affected by disability or those who exceed normative body weight standards. While fear and insecurity surrounding health and disease affect everyone, regardless of race and class, discourses of causation are striated into race- and class-specific articulations such that access to, experiences and outcomes of, health care are profoundly unequal. I want to emphasize that without this produced space of fear and insecurity, these discourses of causation could not have attained the powerful and influential status they currently occupy.

In an era in which middle class North Americans are saturated with information and advice concerning health enhancement and nutritional supplements, advertisements for health enhancement products work within a broader set of discourses concerning environment, health, and causation—and these discourses resonate and hold sway in much broader political debates than those that surround health policy. These discourses provide a model that helps to visualize the role that external influences play in the formation of the individual as political subject. While our contemporary conception of heredity is understood quite specifically as referring to the influence of the *biological* in an individual's formation, and even more specifically as *genetic*, heredity has historically been understood much more broadly. Previous concepts of heredity, though imbricated with biological discourses, referred to social forms of inheritance comprising class understood to be represented by class-specific behaviours. The notion that a form of heredity that is relatively unaffected by independent environmental influences allows for the social reproduction of hierarchies and inequalities was, for instance, a central tenet of the French Revolution. Debates over the nature of heredity, its effects, and its permeability have continued in various forms throughout the nineteenth and twentieth centuries, and some recent iterations of these debates are discussed in the following chapters.

My aim throughout this dissertation is to stress that debates surrounding heredity in the context of biology and medicine are not hermetic ones; these debates are consistently informed by—and, conversely, substantially affect—the forms of maintenance of social and political hierarchies understood as external to biology and medicine. These debates have considered the possibilities and limitations of individual agency in deterministic environments, with biological and genetic determinisms taking on a more important role in these debates in the 1980s and beyond. The question of whether or not an individual can *transcend* heredity and change his or her social class, for instance, relies upon fixed notions of environment, heredity, and causation. At the beginning of the twenty-first century, individual agency and class mobility are dependent upon—if not at least partially defined by—an individual's ability to maintain good health. The conceptual gap between health and wealth is shrinking in North America, and an individual's diligence in disease prevention is increasingly understood as an expression of economic responsibility. What is particularly interesting about these developing cultural norms surrounding health politics is the way in which they oscillate between two quite different concepts of causation. For the first concept, environment plays a very minimal role, and the stuff that comprises the self and determines individual agency is hereditary, both biologically and socially. The second concept emphasizes environmental influence in its model of the self as infinitely malleable. This concept argues that biological heredity does not play as important a role in determining agency and the form of social hierarchies as has been believed.

Genome science—an increasingly influential form of knowledge informing medicine as well as politics more broadly[2]—has not yet decided how to position itself with respect to these opposing concepts of heredity and environment as causal.[3] The

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[2] Genome science has begun to be mobilized by party politics as a form of scientific evidence of difference and as justification for exclusion and other forms of discrimination. To give one example, Veronika Lipphardt and Mihai Surdu's research project on genetic studies of Roma people critically evaluates how scientific studies—and, most recently, genomic studies—of the Roma have been designed and used to legitimize ongoing forms of discrimination and violence. Lipphardt and Surdu note how genomic science is positioned as the primary method of producing trusted evidence about identity, and they warn about the dangers of this epistemology gaining cultural dominance. For example, in 2012, a Hungarian politician part of the right-wing Jobbik party produced DNA test results as "proof" of his "Hungarianness"—that is, evidence that he was neither Roma nor Jewish—as a method of producing evidence of his "ethnic suitability" for political leadership. The debate over genetic ancestry testing and the politics of race and ethnicity is further discussed in Chapter Two.

[3] As Jenny Reardon maintains, this is largely a problem of interpretation. Genome scientists do not want for data, and their sequencing methods are not contested. What

conceptual battleground that lies between the opposing concepts—taking the form of scientific and political uncertainty—has become a fertile breeding ground for middle-class anxiety, Big Pharma, and a booming health supplement industry. Thus, when Vitamin Water promises to create the conditions in one's body for the development of bigger muscles, it is taking a stand in this debate, and asserting that phenotypes are environmentally malleable. Though this isn't stated explicitly, the politics of this company's stand in the debate are extensively researched and not at all accidental.[4]

Two dominant narratives of the human genome circulate in popular understandings of health and the causes of illness. One narrative is of the genome as fixed, predetermined—the genome as destiny narrative. In this narrative, our appearance, behaviours, taste, athletic ability, risk factors for illnesses, and more, are for the most part determined by the genome we're born with. In the second narrative, the genome is profoundly dynamic, variable, and not at all static, even within one individual's life span. Of course these two narratives overlap from time to time, and these aren't the only two narratives through which we understand who we are biologically. However, these narratives inform medical research, policy decisions on health care funding and other social programs, not to mention the choices we make on a daily basis when considering our own health.

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is contested is how the sequenced data should be interpreted as contextualized knowledge.

[4] This insight comes from a personal conversation I had with Dr. Irma Silva Zolezzi, a geneticist who is currently employed by Nestle Corporation. She told me about the extent of the company's investment in hiring scientists with expertise in the developing science of epigenetics—which is showing that the specific kinds of food we eat can cause particular genes to turn "on" or "off," thus determining our health in a very real way—because the company knows that its consumers' concerns will soon turn in this direction, and it wants to pre-empt any potential loss of popularity of its products that may be influenced by emerging scientific data. Put simply, these corporations are cognizant that their advertising campaigns need to reflect the dominant stand in the heredity, environment, and causation debate that its consumers will be tuned in to. Because this debate is changing rapidly, these companies employ cutting-edge scientists to keep the company at the head of the field.

This thesis considers where these narratives come from, analyzes case studies of these narratives at work, and finally looks to the future of these narratives, focusing on the following questions: Who has access to optimization technologies?[5] Why has genetics as a science of optimization come to be seen as more urgent and important than addressing inequalities in social determinants of health? As this thesis argues, the strategic priorities of and limitations to genetic medicine function as a microcosm of a broader social inequality in health. Why are the neoliberal governments of the 2010s Canada and the US investing heavily in personalized medicine and pharmacogenetics when many of Canadians' and Americans' most urgent health problems are environmental rather than solely of genetic cause?[6] How did genetics rise to attain this status in the political and cultural imaginary in the West? As the geneticist, feminist cultural critic, and activist Abby Lippman has argued, genetics has fulfilled a desire for a truth-telling epistemology that can swoop down and offer definitive

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[5] Not all optimization technologies are designed with the aim of enhancement. Many technologies work instead towards maintenance and restoration. In *The Shock of the Old*, David Edgerton critiques the twenty-first century association of "technology" with "innovation," showing that many of the most important technologies we use today were developed decades or even centuries ago, and that their aims are not necessarily transformative. Offering the example of the Netherlands' reliance upon dike technology to maintain the very land structures upon which all of the nation's other technologies have been built, Edgerton critiques the tendency through which we understand only the newest and most "high-tech" electronic technologies as technologies. He notes that older technologies slip into a new category—that of "things we live with"—and that as they lose their status as technologies, and, subsequently, they attain a "common sense" rationality that depoliticizes their development, emergence, and the consequences of their current use. Vitamins, too, are an "old" technology. They too were designed as a tool through which humans could *maintain*—rather than optimize—their health in the absence of adequate nutrition during wartime.

[6] The fact that the US pharmaceutical industry, which increasingly works with genomic researchers to design "personalized" and tailored therapies, constitutes an increasingly large percentage of the American GDP is not unconnected to the increasingly widely held public belief in genetic causation (Eppinger). In Germany, however, common sense maintains that illness is most frequently caused by stress, poor nutrition, and poverty. While pharmaceuticals are important to Germany's GDP, too, the pharmaceutical industry is primarily chemical in Germany, and is not as invested in genomics research as is the US pharmaceutical industry (Eppinger).

pronouncements on all manner of contested subjects—“from family dynamics to legal decisions to advice to parents on behaviour issues in children” (Andrews 12). The appeal of genetics has been connected to its predictive capacity, helping genetics to become enormously successful economically as well as culturally through the wide circulation of the seductive narratives of genetics as they’re taken up in media and pop culture. These ideals are becoming increasingly influential in the research agendas of institutions such as the US National Institute of General Medical Sciences, which, in its pamphlet “Medicines by Design,” imagines the future of medicine in 2050 as an examination of the patient’s DNA preceding a physical examination.[7]

As information, DNA and genes gain economic value since they are understood to contain unique data that can be sold, or invested in for future profit. The value is understood to arise out of DNA’s particular amenability to be interpreted as a particularly powerful form of knowledge. Genes as information come to be understood as units of predictive ability and can be purchased as a glimpse into the future of an individual’s life. The social and political entrenchment of this concept of gene as information is so profound in Western culture today that it has become completely naturalized and understood as common sense to the extent that we cannot imagine the gene as an entity or a concept except through this metaphor. The discourse of technoliberalism[8] insists that genetic information can be made to speak clearly with the help of technology, *but* that this information requires interpretation. It

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[7] “Medicines by Design” was published by the US National Institute of General Medical Sciences in 2006.

[8] Technoliberalism, an episteme that has attained the status of a form of common sense, distracts attention from structural inequalities and disparities through the promise that optimal health, happiness, productivity and wealth are accessible to all through innovations in technoscience—and through hard work on the part of the individual. Technoliberalism maintains that science and technology, like the free market economy, will continually improve, and will also continually improve the well-being of the self-sustaining individual.

is important to note that this technology is figured as merely interpretive rather than as a form of mediation or intervention; the information is said to be relayed to us *directly* through an alternate form rather than being altered in *content*. A great deal of media emphasis and hype get placed on genetic questions from which follows this figure of the "optimized individual": in this paradigm, health is not a question of access to resources—including safe housing, clean water, nutritious food, education, and health care—but instead the management or processing of information that are understood to precede changes in behaviour[9]. Owing to the speculative nature of these sciences, the genetic paradigm enacts a sort of temporal displacement in that our attention to today's social problems gets averted to the distant future, consumed in risk and probability, and the *idea* of these future problems occupy the space of today's crises, displacing urgent problems that we should be dealing with in the here and now.

How Does Knowledge about Causation Move from the Lab to Policy to Hospital?

One of the most important analytical threads of this project asks how the concept of human variation has informed the cultural dominance of genetic thinking, and the increasing dominance of genomic medicine in the clinical setting in North America. In her participant-observation study *Between Bench and Bedside: Science,*

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[9] The language of risk and probability finds particular currency in this context, akin to that which Foucault theorized as governmentality. A normalizing and moralizing type of power that endows individuals with the rights and responsibility to manage their own health and well-being through practices of the self, self-regulation, and self-surveillance, Foucault's subject of governmentality is attentive to risk as a compass that directs behaviour. Governmentality today is reliant upon the systems of knowledge circulated by biomedicine and technoliberalism to render particular sets of behaviours practicable and moral; this is the framework through which individuals' practices of self-surveillance and self-discipline become comprehensible.

Healing and Interleukin-2 in a Cancer Ward, Ilana Löwy points to the ways in which a scientific object is ontologically transformed on its journey from research laboratory to the clinical setting of the hospital. Tracing the development of the cancer therapy Interleukin-2 from theoretical formulation in the lab to the messy pragmatics of the clinical trial, one of Löwy's insights of greatest relevance to this project is her characterization of this movement from research to clinical setting as a non-linear one. A great deal of scholarship in STS has addressed the heterogeneity of motivations and influences that inform the type of innovations produced by lab scientists; it is clear that only a minority of innovations produced in research labs can address and "fit" to a set of needs that exist outside of the lab. Löwy draws our attention to the way that an innovation's potential to gain status as a dominant therapy in the clinical setting is "strongly affected by the degree of compatibility between the innovation and a specific medical culture" (279). Löwy shows that adaption takes place in both directions: the new research innovation is invariably shaped by the clinical environment it is introduced to—including the institutional practices and norms of the particular hospital, as well as the dominant "knowledge claims" circulating amongst local physicians—thus taking on a specific local form, a permutation from the general theoretical object produced by the lab. But, at the same time, the clinical environment is fundamentally altered through the process of making space for the new innovation. As Löwy shows, it is the "existing practices and knowledge claims that constrain and guide the choices of doctors and scientists" (279). I contend that these epistemic cultures of medicine and science that have shaped the profoundly influential institutions I examine in this dissertation—the Canadian eugenics movement, race-targeted medicine, personalized medicine, Genome Canada, and public health campaigns directed towards Indigenous people—

have not yet been adequately studied. The logic of causation that I argue informs all of these diverse institutions persists today and is likely to continue to gain influence in the decades to come.

The question of causation is such a crucial one for understanding the logics of governance, regulation, science and medicine in the context of a welfare state and settler colony like Canada because of the political stakes of the attribution of responsibility for the costs of health care and other forms of support. The government of a welfare state that is also responsible for the particular health needs of Indigenous populations (as much as the government tries to escape and deny these responsibilities) will inevitably focus on demarcating criteria for medical intervention that will work to absolve the government of responsibility as much as possible. As Löwy describes, in the clinical setting, some medical conditions are understood as caused primarily by "lifestyle elements" (individual behaviours and habits), and others are cloaked in a vague form of causation characterized as "science-laden" (281). In the latter case, the individual is absolved of responsibility (most commonly when the cause is pronounced as genetic), while in the former case, the state is absolved of responsibility for the individual's heath.

Health policy in Canada swings incredibly inconsistently between the two paradigms of the genome. While increased funding for personalized medicine suggests an ideological alignment with the doctrine of genetic predetermination, the epigenetic paradigm is strategically invoked in public health campaigns directed towards First Nations, Métis, and Inuit children. However, studies in epigenetics as well as inaccuracies in genetic ancestry testing have begun to destabilize genetics as dominant narrative. Recent research in epigenetics is showing that what have been understood as our "genetic destinies" are in fact environmentally contingent and much more malleable than once believed. The expression and function of genes have been shown to be regulated by the epigenome: this is a set of processes such as DNA methylation (Maulik and Maulik 2). The epigenome is anything *but* set in stone. Epigenetic processes have been shown to be profoundly affected by their environment—a discovery that radically overturns notions of genetic determinism and risk factors remaining static throughout the life span for genetically identical individuals. Genes can be “switched on” or “switched off” by the epigenome as a result of interaction with a number of environmental factors, including the food we eat, the type of housing we live in, exposure to radiation and toxins, as well as communicable infections we’re exposed to.[10]

Recognizing the role of the epigenome has ushered in a revolution in the way predisposition and genetic susceptibility are understood, as well as the idea that an individual’s traits—from personality, likes and dislikes, and phenotypic appearance—are predetermined and unalterable. The epigenome—dynamic and transient—is moulded by its environment, leading researchers who study the relationship between nutrition, the epigenome, and cancer risk to proclaim a new relevance for the phrase “you are what you eat.” Now that epigenetic studies are showing that protein changes that can alter gene expression can be inherited from generation to generation—not

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[10] Epigenetics is providing much-needed scientific evidence for the need for reparations and affirmative action by offering a scientific account of how trauma and all of its attendant effects, including differential susceptibilities to disease, are passed between generations through changes to the genome. On the other hand, though, a rising to dominance of epigenetic science also opens up epistemic space for victim-blaming through highlighting how women’s diets and psychological states during pregnancy can cause changes in gene expression within a single generation. This way, a mother can be blamed for her child’s illness that is equally likely to be caused by the leaching of industrial chemicals into groundwater. So in this way, we are dealing with yet another epistemology that can be used as justification for individualizing blame and the elision of social factors such as unequal access to health care, housing, education, and nutrition, as well as unequal exposure to environmental contaminants, as determinants of health.

just affecting a single life span—the rigidity of Watson and Crick's "central dogma" is threatened. Epigenetic researchers have also used computing metaphors to explain this shift, suggesting that the human genome be thought of as the body's "hardware" and the epigenome as the body's "software" (Maulik and Maulik 1). Needing a way to differentiate their field of study from that of biochemistry in the 1950s, molecular biologists began using the computational metaphor of "the code"—and this understanding of genetics as a secret code requiring unscrambling has stuck ever since. Unfortunately this metaphor is quite misleading—suggesting that the individual can prompt his or her body to behave entirely differently by selecting the right software (making the right 'lifestyle choices' and other moralistic imperatives). This shift opens up the conceptual space for individual responsibility for health, as well as a culture of blaming the victim for health problems, instead of directing attention to the social and environmental determinants of health that are often beyond the individual's control and are more frequently the culprit in placing individuals at higher risk for disease. An example of this phenomenon is the lack of availability of fresh food—"food deserts"—in many lower income urban areas in North America. I show how this normative concept of health as the end result of a process of careful self-management provides the ideological underpinnings for government devaluation of particular populations according to the metric of biovalue.

Gradients of Biovalue

This dissertation addresses the politics of public health and health disparities' relation to racial inequality in North America, focusing on institutional sites of knowledge production surrounding disease causation, especially those sites in which knowledge of the structural determinants of health is obscured. An analytical focus of this project is on how the scientific production of knowledge concerning human health and its causal mechanisms is influenced by state institutions and forms of governance, and, in turn, how state institutions and forms of governance are influenced by knowledge and norms produced in scientific laboratories (as well as genomic sequencing machines and the pharmaceutical industry). Part of this study centers around differential rates of disease in Indigenous communities in Canada, and how this phenomenon has been studied by scientists, addressed by governments, and taken up in the public imagination.

A great deal of scholarship in both Science and Technology Studies[11] and literary and cultural studies[12] has addressed the social, political, and ethical repercussions of the molecularization of biology. Particularly influential and productive to this growing field of scholarship has been Catherine Waldby and Robert Mitchell's theorization of the political stakes and specific form of output produced by molecular biology. Waldby and Mitchell coined the term "biovalue" to refer to "the surplus of in vitro vitality produced by [molecular biology's] biotechnical reformulation of living processes" (*Tissue Economies* 32). In affixing the "bio-" prefix to characterize the particular form of value produced by molecular technology, Wadlby and Mitchell emphasize molecular biology's general orientation towards maximizing organisms' productive capacities at the cellular level. Locating biologists' "manipulation of productivity" (32) in the context of a twenty-first century

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[11] See, among others: Kaushik Sunder Rajan, *Biocapital: The Constitution of Postgenomic Life* (Durham: Duke University Press, 2006); Laura Mamo, Adele Clarke, Jennifer Ruth Fosket, Jennifer Fishman, and Janet Shim, *Biomedicalization: Technoscience, Health, and Illness in the U.S.* (Durham: Duke University Press, 2010); Jenny Reardon, *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton: Princeton University Press, 2004); Natasha Myers, *Rendering Life Molecular* (Durham: Duke University Press, 2015).

[12] See, among others: Susan Merrill Squier, *Liminal Lives: Imagining the Human at the Frontiers of Biomedicine* (Durham: Duke University Press, 2004); Eugene Thacker, *The Global Genome: Biotechnology, Politics, and Culture* (Cambridge, Mass.: The MIT Press, 2005).

shift towards “speculative biology,” Waldby and Mitchell argue that the new site of intervention for science is not “the stable and known properties of tissues, but…the *capacity* of tissues to generate new and unexpected forms of value” (108, my emphasis). While I, too, have found Waldby and Mitchell’s analysis particularly productive for rendering legible the co-constitution of molecular biology and processes of financialization and speculation, I contend that this focus on the politics of molecular biology leaves unexplored other sites in which science and state policy work together to manipulate living beings’ productive capacities. Thus, taking up the analytical insights made possible by Waldby and Mitchell’s theorization of biovalue and looking outward to a macro scale of biovalue, this thesis draws attention to discourses of causation through which state policies and institutions have worked to maximize the production of biovalue. I analyze the forms of biovalue that are identified, and the ways in which they are maximized in the seemingly disparate state institutions of eugenics, Indian Residential Schools, race-targeted medicine, and, finally, the ostensibly humanitarian institution of public health.

A significant amount of scholarship has been devoted to the analysis of molecular biology, and rightfully so, considering the enormous economic investment it has attracted, as well as the ever-growing profit it produces. I argue, though, that its epistemological newness has been overemphasized, and that a focus on the particularities of molecular biology has left other forms of knowledge and value production in the arena of medical research that influence health policy as well as the everyday lives of people around the globe, relatively undertheorized. My analysis of state efforts to maximize productivity through projects designed to increase macro-scale biovalue positions these state projects as antecedents and less-recognized contemporaneous allies of the more readily recognizable molecular form of biovalue production. In a sense, then, this thesis looks backwards from the molecular conceptualization of biovalue to ask how previous institutional methods of producing biovalue provided epistemological and political precedents that paved the way for molecular biology to gain dominance. I position the articulation of discourses of causation as the thread that links these disparate institutions, historical periods, and political contexts together as a sort of truth-telling mechanism[13] that can legitimate both the science and its accompanying state policies in the different institutional contexts.

Environmental Causation, Micro and Macro

One of the most important outcomes for knowledge concerning causation of disease after the Human Genome Project was completed was the insight that important mechanisms in the causation of health and illness lie *outside of* the human genome. If this was not the case, and these mechanisms were found to be controlled by the genome, then the HGP would have yielded more useful information on genomic factors and types that cause human disease. This research outcome was both disappointing to genomic researchers *and* financially disastrous: investors in the HGP had banked on forthcoming profits from pharmaceutical applications of knowledge gleaned from the HGP, but very little knowledge with any use value was produced.

An important element of this period after the HGP—what Jenny Reardon calls “the postgenomic condition”—is a quest, both intellectual and financial, to increase the productive capacity of the knowledge gleaned by the HGP. Or, rather, to render the data collected by the HGP into a form of knowledge that can be of some use, and particularly of medical use, and not only because investors are demanding to see

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[13] In the sense that discourses of causation are presented as scientifically “objective,” and therefore inherently unbiased and apolitical.

some return on their investment. A major focus of research in this postgenomic period has been on the specific mechanisms of what has been identified as the locus of causation of disease after the HGP: the space of "gene-environment interaction." As this dissertation contends, neither the meaning of the "gene" nor of the "environment" referred to in this formulation is self-evident. In tracing the permutations of both concepts—gene and environment—over the last eighty years, this dissertation offers a social and political contextualization of these concepts that do so much political work, secure enormous research grants for scientists, and hold tremendous sway over which medical therapies reach hospitals and which never make it past the lab bench.

As part of the postgenomic quest to identify causal agents in the development of human disease, "environment" has been conceptualized as both internal and external (within the body and beyond the bounds of the body), as well as individual and collective. For instance, in the field of exposomics, researchers attempt to measure how so-called environmental exposures that take place within the human body can effect the behaviour of heritable elements of causation, such as the expression of genes. However, exposomics researchers lack a mechanism through which to contextualize their individual study subjects within an external environment. And thus the pre-genomic problem rears its head again: a microscopic lens is trained to an individual environment within an individual body, and interactions between individual bodies and external environments—what is known to be the locus of disease causation—continue to elude our understanding. It is very difficult to produce knowledge about this space of interaction, and there is certainly political resistance to research in this direction, especially considering the potential cost of such knowledge for the Canadian government as one that under the current Conservative government retains social welfare elements such as universal health care, but that is also implementing austerity measures. But, as I argue, this space of interaction has long been a focus for politicians, scientists, and social scientists, even when not named as such. Today's exposomics research is only the most recent incarnation of the study of this important space of interaction, and it is one that produces data that conforms to the dictates of a culture that champions empirical evidence over all other forms. My study of the approach to and theorization of this space of interaction begins with an examination of interwar public health research in Canada—a field that during this period was synonymous with the eugenics movement. During the interwar period, knowledge about this space of interaction appeared in quite a different form, in accordance with the norms of eugenic science.

This dissertation investigates different forms of evidence mobilized in the production of state knowledge concerning health as well as the production of Indigenous knowledge around health in the Canadian context.[14] It also addresses the politics of knowledge brokering as a constitutive element of any health care regime. I analyze how the Canadian government has measured and anticipated the health care needs of its populace, with particular attention to articulations of an underlying conception of causation that was divided between Indigenous and non-Indigenous populations. How did state institutions understand these needs to vary based on groups' ethnicity and particular susceptibilities? How were different strategies designed to best address these needs (and to anticipate in order, ideally, to prevent, future needs) based on geographical and cultural context? Was Indigenous knowledge

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[14] I want to acknowledge and interrogate my position as a white Canadian of British ancestry who has benefitted from many of the institutions of the settler colony of Canada—institutions built on unceded Indigenous lands whose founding was made possible by the expropriation and colonization of resources belonging to Indigenous people (including land, language, and personhood). I position myself personally, politically, and academically as an ally of Indigenous peoples, and my work on systemic racism in Canada aims to work against, or at least illuminate, the structural barriers that allow my voice to be more readily heard than Indigenous voices.

concerning health held in tension with state policies and measurement techniques? I conclude by considering the politics of Genome Canada as a new paradigm for health and medicine in Canada. I argue that its very establishment reflects a political position that has not yet been publicly identified and debated, as should be required in a democratic state like Canada. The abundant funding directed towards Genome Canada signifies a government decision that the needs of its populace will be best addressed by genomic research and pharmacogenetic medical treatment. Once again, I ask what happens to the other epistemologies of health—including traditional Indigenous knowledge as well as considerations of the social determinants of health—in the mono-epistemological climate that genomic Canada is quickly becoming.

An abiding question that surfaces and resurfaces throughout this dissertation is the following: what counts as evidence—that is, evidence of harm, of need, of inequality, and of the presence of health and disease—for government policymakers working on health policy and the funding of medical research? I wager that the dominant answer to this question of *what counts as evidence* has changed very recently. Throughout the research for this project, I have been attentive to the ways in which sociologists and STS scholars working on health disparities argue for the trustworthiness or 'evidenceness' of the evidence their studies present. The surprising popularity of the French economist Thomas Piketty's 696-page long *Capital in the Twenty-First Century* (published by Belknap Press in 2014) attests to the fact that the "empirical turn" is not just an academic one, but a popular one. Piketty's book, which rose to first place on Amazon.com's bestseller list shortly after its release in April 2014 (Moore), shatters the American Dream by illustrating how capitalism as political-economic system reproduces not only inequality, but also inequality of opportunity, such that ‘changing one’s class’ becomes impossible. Piketty, calling for reform measures such as the implementation of inheritance tax and debt relief, does not deliver a message that is new. Many leftist economists have made similar arguments, yet the public has paid little notice. What is new about Piketty’s book is that it presents an unprecedented array of data on the reproduction of inequality as it has occurred in twenty countries over a period of almost two centuries. This data is received by the public as a form of “incontrovertible evidence,” allowing Piketty to escape accusations that would otherwise fly from the mouths of his intellectual opponents on the Right.[15] Instead of being characterized as an ideologue, Piketty is hailed for the thoroughness and comprehensiveness of his study; he is seen as a Truth-teller who is “letting the facts speak for themselves.” This is the new mood following the empirical turn in which sociology has had to become quantitative. This turn has profound implications for the study of health disparities and of the social determinants of health because along with this era in which nothing outside of data can count as evidence, we have seen the cutting of funding for studies that would provide data on social and environmental determinants of health. In the absence of adequate data, it is very difficult for researchers to make a case for the funding of needed studies through which to produce this data. In this context, researchers who point to the dangers of particular environmental conditions for human health, such as pollution, are often decried as conspiratorial and paranoid, their claims rendered murky and said to be lacking for evidence.[16]

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[15] See, among others: Benjamin Kunkel’s “Paupers and Richlings,” Paul Krugman’s “Why We’re in a New Gilded Age,” and Heidi Moore’s “Why is Thomas Piketty’s 700-page book a bestseller?” as well as Moore’s “Thomas Piketty is a rock-star economist—can he re-write the American dream?”

[16] Sarah Kanouse’s documentary film *Around Crab Orchard* shows how local knowledge of industrial contamination affecting the health of humans, animals, plants, and waterways in the Crab Orchard National Wildlife Refuge in Williamson

The Absent Presence of Personalized Medicine

While undertaking the research for this dissertation, I often found myself in conversation with scholars who doubted the existence of my research subject. It was, in fact, this pervasive doubt surrounding the material existence of the practice of personalized medicine—the developing industry that proposes to transform genomic data characterizing the traits that vary between individuals in a population into unprecendently efficacious, because unprecendently tailored, forms of medical therapy—that persuaded me of the importance of making personalized medicine my object of study for this project. I was particularly interested to note that those interlocutors who were most sceptical about the study of personalized medicine were those whom I had initially assumed to be its greatest supporters: medical researchers and physicians. The less familiarity the interlocutor had concerning genetic medicine and the science of personalized medicine, the more likely they were to enthusiastically support the project. It seemed it was the would-be practitioners of personalized medicine who particularly wanted to avoid any outside scrutiny of their work. Further, they were only willing to talk with me off the record, a pattern that is likely to become even more common in the increasingly repressive "science-muzzling" political climate of Prime Minister Stephen Harper's Canada.[17] And this is

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County, Illinois is contested and suppressed at a number of institutional levels, including through a FBI intervention designed to limit the circulation of citizen scientists' data. See also Shiloh Krupar's *Hot Spotter's Report: Military Fables of Toxic Waste*.

[17] Scientists who conduct research as part of one of Canada's federally funded research institutions have had their communication with journalists and other members of the public monitored and censored by government media relations officers since 2008 (Buranyi). Journalists wishing to interview Canadian scientists must submit interview questions for government approval, and "scientists may have their responses cut and edited before being released" (Buranyi). These forms of mediation and censorship have been criticized as a form of "science-muzzling," and

not a problem that is restricted to the context of Canada's current Conservative government. Many neoliberal governments invoking austerity measures worldwide are bound to cut funding for research on social and environmental determinants of health while simultaneously investing in potentially lucrative and PR-friendly genomics research.

In response, then, to the silences and dead ends that characterized my inquiry into the practices and therapeutic potential of personalized medicine, this dissertation performs a rhetorical analysis of the circulation of personalized medicine as what can be characterized as a content-less concept. Physicians tend to respond cynically to inquiries about personalized medicine because (1) personalized medicine has not yet been developed into a set of proven clinical practices, so exists more as a concept at this stage, and (2) even if personalized medicine was developed into a set of clinical practices, it is believed that these practices would not be more therapeutically effective than clinical practices that assess individual typologies[18] that are already in place today. Despite experts' scepticism about the potential efficacy of personalized medicine, funding for development of personalized medicine in Canada greatly outweighs funding earmarked for the development of medicine that takes a more complicated and multifactorial concept of causation into account. I argue that this

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these barriers prevention the dissemination of scientific knowledge have inspired public campaigns such as Natasha Myers and Max Liboiron's "Write2Know" campaign, which draws public attention to these government practices and their consequences for public knowledge and our ability to critique policy. Some of the most highly censored research topics include climate change, the environmental and health impacts of the Oil Sands, and the pollution of waterways. While Prime Minister Stephen Harper's government has not offered an explanation for this censorship, the politically contentious nature of the knowledge being gathered about the effects of such economically important industrial projects is clear. Public engagement with government policy—as well as political resistance—is significantly hindered by restricted access to scientific data, a fact that also is likely to underlie Prime Minister Stephen Harper's government's cancellation of the long-form census.

[18] Including, for instance, the practice of NHS physicians in the UK to consider patients' social class when deciding on a treatment protocol.

discrepancy in funding—while not scientifically justifiable—can be at least partially explained by the government's valuation of the rhetorical work done by the "personalizing" nature of this industry and its ability to divert attention away from politically contentious concepts of causation and towards the atomizing, inward gaze that focuses Canadians on self-management.

For this study, I considered what sort of social and intellectual precursors and precedents needed to be in place for the concept of personalized medicine to ascend to dominance as a rhetorical device, and to attain the much-coveted status of research paradigm. These questions led me to write the study that unfurls in the subsequent pages of this dissertation: a prehistory of the emergence of personalized medicine in Canada. The dissertation offers a genealogy of the intellectual lineages and practices that produced personalized medicine in its contemporary form: a form of hype, a buzzword that is featured on research grant applications as the much lamented but undeniable key to fundability, even in a climate in which most researchers contest its therapeutic efficacy, and, increasingly, the new lynchpin for the hope of a generation that primarily fatal diseases, such as cancer, will be cured.[19]

This dissertation began as an inquiry into the different forms of inequality created and perpetuated by the contexts of health and medicine, fuelled by a desire to reveal the ways that scientific and technological complexity can occlude understanding of the political and structural mechanisms that increasingly align health with wealth. How could it be that certain biological narratives are circulated and taken up as objective to the extent that gross inequality is no longer perceived as such,

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[19] Though, per capita, cancer is not the most fatal disease in Canada. The most fatal diseases in Canada are not addressed by the paradigm of personalized medicine, and this fact is of particular interest to this dissertation. Personalized medicine is not designed to address the greatest need in health care. This thread of misplaced attention is addressed at length in Chapter Two.

but instead seen as the natural and inevitable result of biological difference, typology? What is it about scientific explanations that encourage the disavowal of the social and political as determinants? When a specific scientific study is discussed, there is a tendency to turn immediately to an evaluation of the science—as though the only question is the validity and explanatory power of that particular study. Is it good science or bad science? Was the sample size large enough? Who funded the study? While these questions are extremely important, the inordinate focus on these questions shifts the focus away from the social context of the subjects of the science. As a result, a number of assumptions are often made that perpetuate understandings of inequality as natural and unchangeable. As I continued to investigate these questions, I began to trace the narratives that support these assumptions, and I noticed that it was not the reductive categories and typologies themselves that held the seeds of striation and inequality, but the complex ways in which these concepts came into being. I began to understand these categories of racism and the uneven distribution of disease as placeholders, and as symptoms, of a larger set of processes—contained within and expressed by discourses of causation—to which agency is not often ascribed. While the violence perpetuated through these categories requires urgent attention, without a doubt, I wanted to try to understand what animates these more familiar and widely analyzed forms of exclusion and inequality and the ways that they are linked to personalized medicine, shifts in understandings of health, and, increasingly, genomic science.

This dissertation traces the form of epistemological uncertainty surrounding the nebulousness of the "personalizable" medical object—for researchers in lab settings, for practitioners in the medical setting, and for researchers like myself. What does it mean to trace an object to which so much attention is directed in the form of research funding, but which is never actually defined, and only rhetorically gestured towards? As I argue through my discussion of Helen MacMurchy and the Canadian eugenics movement, the locus of medical intervention has been nebulous for more than a century. It is this intellectual struggle to define the "actionable" site of human health, and the politics of this struggle, that is the central concern of this dissertation.

In this history of the present[20] of the concept of personalized medicine as produced by the biomedical paradigm[21], I look to the set of ideas that I contend underlie both public health and pharmacogenetics—that is, the development of pharmaceutical products tailored to individual and group variations in genetic biomarkers.[22] The biopolitics of hygiene gives rise to multiple discursive sites in the Canadian context: to MacMurchy's eugenics early in the twentieth century, and, at the turn of this century, to public health campaigns targeted towards Indigenous

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[20] Methodologically designed as a Foucauldian archaeology, or a "pre-history" of the concept of personalized medicine as it circulates at the outset of the twenty-first century.

[21] The biomedical paradigm is conceptualized as distinct from its predecessor, medicalization, through an emphasis on the ways that biomedical knowledge and practices are produced together with technoscientific innovations. Biomedicine, then, transforms the social and epistemic norms of its objects through the integration of tech innovations and therapeutic care, thus also changing the relation of medicine to its objects. Medicalization was characterized by its capacity for control, while biomedicalization is understood to be ontologically transformative. Adele Clarke et al. locate this shift from medicalization to biomedicalization in the 1980s, at the height of the molecularization of biology. The biomedical paradigm "may exacerbate rather than ameliorate social inequalities" stemming from the way in which "biomedicalization carries *within itself* the ideological, social, and cultural infrastructures that support and maintain racial and class inequalities" (Clarke et al. 29, emphasis in the original). Further, the circulation of biomedical knowledge is understood as a for-profit enterprise, as opposed to the previous practices of knowledge dissemination under medicalization, which were understood to have at least some pedagogical or humanitarian aim (Taussig). The distribution of biomedical knowledge, Taussig argues, is primarily designed to shore up public support for genomic research, which has an insatiable need for DNA samples to be provided by the public.

[22] The methods through which particular biomarkers are produced as objects of knowledge, are understood as therapeutically effective, and are attributed economic value in scientifically demarcating the bounds of a particular group (sometimes codified as 'ethnic' or 'race-specific'), are discussed in detail in Chapter Two.

people in Canada, and to the funding of genomic research and the quest for "actionable" applications of this research through the paradigm of personalized medicine.

Health as Morality

What does it mean to be "healthy"? What qualities does a state of "health" or "healthfulness" describe? Health is primarily defined as the negation of its opposite: health is the absence of illness. Health is ease and the freedom from disease. Health is a system running properly, a system free of pathology. Western conceptions of health often invoke the Cartesian split: it's fine to be a bit depressed as long as our bodies are healthy and free of disease.[23]

Further, and it is upon this particular conception of health that the personalized medicine industry relies, health is the optimization of our bodies as a method of risk management. This latter conception of health arises from a temporal shift: it is no longer enough to be free from disease in the present. The focus of health is futural, while requiring action in the present: we must act now (through nutrition, exercise, gene therapy, preventative screenings and even preventative chemotherapy) to prevent the onset of future illnesses. The prescription and regulation by states and institutions of a normative concept of health was precisely the social, cultural, and political project of eugenics. Needless to say, even apart from policies of exclusion that discriminate against those who don't fit within normative concepts of health, social and cultural forms of exclusion and denigration abound. This concept of health, co-produced with neoliberalism and biomedicine, works to absolve the state of

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[23] See, among others: Ann Cvetkovich, *Depression: A Public Feeling* (Durham: Duke University Press, 2012); and Gabor Maté, *When the Body Says No: Understanding the Stress-Disease Connection* (New York: Wiley, 2003).

responsibility for individual health, ultimately molecularizing the concept of health as well as scientific practices such as epidemiology that were developed in the interest of collective health. The concept of “genetic hygiene” refers to this initiative towards optimizing individual health on a molecular level—the misguided but nevertheless generously funded goal of much medical research today.[24] As many scholars have argued, the concept of health is an insidiously normative one that continues to be bandied about as a synonym for both the common good *and* what is best for individuals.[25] It is here that I want to begin: the interesting formulation of both individual and collective benefit that motivated the eugenicists in the first place. Finally, I examine the conceptual twinning of the concepts of race and health in “racial hygiene,” and look at the ways in which these ideas inform developments in Big Pharma today.

Lauren Berlant’s article “Slow Death (Sovereignty, Obesity, Lateral Agency)” offers an important intervention by troubling the very conception of agency that has informed and allowed for the entrenchment of this normative concept of health. Berlant argues that a consideration of the set of conditions for life under late

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[24] Many physicians and health care workers have spoken out against the increasing direction of funding towards genetics research. For example, in November 2011, the society for German neurologists met in Berlin and wrote an open letter to the state requesting that funding for genetic research on Alzheimer’s disease be cut. The physicians argued that genetics research on Alzheimer’s is overfunded to the detriment of research that could help patients with Alzheimer’s disease. They argued that genetics research has not and is not likely to make any headway whatsoever, and instead funding is needed for non-genetic research in medical care for Alzheimer’s patients as well as for funding of long-term care facilities, etc. This letter forms part of an initiative to reverse the futural logic of medical research and funding and to return the focus to pragmatic responses to present crises (though not suggesting the futility of preventative screenings and genetics research for illnesses for which the proper locus of intervention is genetic).

[25] See, among others: Tanya Titchkosky, *Disability, Self and Society* (Toronto: University of Toronto Press, 2003); Jonathan Metzl and Anna Kirkland, eds., *Against Health: How Health Became the New Morality* (New York: New York University Press, 2010).

capitalism reveals that we can no longer assume that individuals' actions are informed by the kind of intentionality that we have understood to be constitutive of agency. Individuals' actions are most often *not* deliberate or even thought-through; for Berlant, aligning intentionality with agency has allowed neoliberal ideology to pathologize non-normative bodies. We must recognize a disparity in access to consciousness and deliberate activity because "linking and inflating consciousness, intention, and decision or event…has provided an alibi for normative governmentality and justified moralizing against inconvenient human activity" (Berlant 755). Many of the medical pathologies that normative concepts of health want to ascribe to individual fault can be more accurately described as products of late capitalism. Most people are struggling just to get by, working multiple jobs to try to manage debt, she writes, and any ascription of agency as defined by the assumption of intentionality—when structural conditions render intentionality an inaccessible privilege granted with the luxury of free time and minimal stress—is misguided. Berlant asks us to reject "normative notions of agency" (758) and to reconceptualize agency as merely "an activity of maintenance, not making; fantasy, without grandiosity; sentience, without full intentionality; inconsistency, without shattering; embodying, alongside embodiment" (759). In a similar vein, James Quesada, Laurie Kain Hart, and Philippe Bourgois put forth the concept of "structural vulnerability" with the aim of making legible the causal relationship between poverty and "the everyday violence of imposed scarcity and insecurity" (342) and the development of disease. Quesada, Kain, and Bourgois locate the origins of this vulnerability in "political-economic and cultural rationales" and "historically specific modes of governmentality in a social milieu and political context of marked indifference to the afflicted" (342). As I argue, the issue is not only one of indifference, but an inability to recognize and take into account the needs and interests of those who are rendered vulnerable by any particular paradigm.[26] Quesada, Kain, and Bourgois emphasize the limitations of the concept of agency in their case study on the health of Latino migrant labourers in the United States, arguing that their concept of structural vulnerability reveals the privilege implicit in the very notion of agency. Those affected by structural vulnerability and precarity, they argue, live lives structured by "forces that constrain decision making, frame choices, and limit life options" (Quesada, Kain, and Bourgois 342). In my thesis, I analyze institutional norms with an eye to an uneven distribution of agency and vulnerability.

Culture of Culpability

How did genomic knowledge attain the status of matter of concern and preeminent form of evidence for medicine, totally eclipsing other forms of knowledge pertaining to human health—and particularly knowledge concerning the social determinants of health and environmental contamination as causal factors in the development of disease? The answer to this question is at once straightforward (capital and the state's fiscal health are supported by the former and threatened by the latter),[27] while also begging further scrutiny.

The act of ascribing responsibility is essential for the medical insurance industry. "Innocent" patients will have health care costs covered; on the other hand,

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[26] For more, please see the discussion of standards, metrics, and the politics of evidence in this Introduction.

[27] One of the foci of this dissertation is the hierarchy of needs that operates within this context of uncertainty around the mechanisms of disease causation and prevention. This hierarchy can produce moral panics—for instance, the panic surrounding Ebola in 2014. While mortality rates from Ebola are not nearly as high as mortality rates from malaria in West Africa, the Ebola outbreak elicited a moral panic and paranoia in Western nations stemming from the uncertainty surrounding the causation and mechanism of transmission of the disease.

patients considered culpable in producing their own afflictions do not qualify for full insurance coverage. The insurance industry needs to be able to make a decisive demarcation between guilt and innocence; this set of insurance industry norms and the dominant American medical and pharmaceutical culture—which extends beyond the realm of medicine and merges with neoliberal and neo-colonial attitudes concerning responsibility and merit—have been co-produced.[28] The concept of the "pre-existing condition" does, in this context, functionally describe the living conditions of all but the wealthiest.

This project will show how the now-dominant epistemological framework (and set of practices) of biomedicine shapes a culture, together with the culture of neoliberalism, in which health is understood to be divided into two quite separate realms: the internal and the external, or that for which we are responsible, and that which we cannot change. True to its form as a type of ideology, this demarcation is never uttered explicitly, yet its effects are profound and far-reaching—and not limited to the realms of health and medicine. Crucial to the successful implantation of this ideology is the ascription of individual agency to health. The cultural entrenchment of this notion of health-as-morality emphasizing individual agency and responsibility in an atomizing neoliberal form has taken a particularly ugly turn with the anti-vaccination movement. The decision of many white, wealthy parents in North America to refrain from vaccinating their children has resulted in measles outbreaks in California and New York in 2014. [29] Of course, just two years earlier, the properly

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[28] See Dan Bouk, *How Our Days Became Numbered: Risk and the Rise of the Statistical Individual* (Chicago: The University of Chicago Press, 2015).

[29] The production of epidemics of preventable disease in some of the world's wealthiest districts registers as particularly perverse in a global context in which (to name just two examples of contemporary disease epidemics in which those afflicted possess very little agency) the Ebola epidemic rages on in West Africa—perpetuated and worsened by poverty and a lack of resources (Phillips 2014)—and the measles

moral decision to be taken by parents was to framed as that which would 'protect' children from harm: avoiding vaccination whenever possible. Thus behaviours that constitute "taking responsibility" and "being a moral social subject" hinge upon the permutations of the ever-changing dictates of technoliberalism. As a strategically unstable episteme, technoliberalism's flexibility allows it to produce new moralisms on short notice.

In America, the wealthiest people—the ones who shop exclusively at Whole Foods and who will serve only organic foods to their children—respond to the ideological imperative to "enhance" their health by appeals to a notion of "purity" that is supported by the mania around consumer goods that promise various sorts of detoxification. That the medical community is not exempt from this ideological entrenchment of this ideal of "purity" speaks to the pervasiveness of the concept of hygiene in its contemporary instantiation. In February 2015, the Arizona cardiologist Dr. Jack Wolfson was interviewed on CNN. "I'm not going to sacrifice the well-being of my child," he said in regard to his anti-vaccination stance. "My child is pure." When asked if he was concerned about the threat posed to immune-compromised children (including children undergoing chemotherapy treatments for cancer), Wolfson responded: "It's not my responsibility to be protecting their child…I'm not going to put my child at risk to save another child." While Wolfson's stance is an uncommon one in the North American medical community,[30] it can be read as symptomatic of the entrenchment of the logic of hygiene and personal responsibility

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epidemic ongoing in Syria in 2015 in which measles infections continue to increase in number as the civil war in Syria rages on and aid organizations' vaccination campaigns are interrupted by fighting. For more on the obstacles to vaccination in Syria, please see: "Syria: Measles Epidemic Signals Growing Humanitarian Needs." http://www.msf.org/article243/syria-measles-epidemic-signals-growing-humanitarian-needs

[30] It is a stance shared by very few medical practitioners, but it is important to note that this stance is an influential and increasingly well funded one.

for health in the post-genomics era of neoliberal “personalized medicine.” It is this ideological climate, I argue, that is so profoundly allergic to social determinants and public health approaches that prioritize the collective good over individual advantage. This increasing resistance to forms of intervention that take the collective (and not the individual) as object of intervention results in a cultural hegemony enjoyed by hereditary explanations of disease causation, and the dismissal or non-recognition of environmental explanations, as will be shown in the following chapters.

Mel Y. Chen characterizes the culture within which the presence of environmental contaminants inversely follows the flows of global capital as one in which concentrations of contaminants can be discursively classed and racialized only *because* of a cultural precedent through which we are understood to be responsible for our own health. Chen contends that communities possessing the *least* capital worldwide tend to be most affected by environmental contaminants, as living conditions at these sites are profoundly degraded by the toxic after-effects of resource extraction. The state and state institutions are understood as regulatory bodies, minimally responsible for preventing harm, but ultimately it is individual behaviours that are seen as attritional. As Chen writes, “in a culture of responsibility, self-care, anxious monitoring, and the like, toxicity becomes a predictable figure” (192-193). She argues that the construction of a mass paranoia concerning the location and potential harm done by toxic materials is predicated upon particular discursive constructions of “science” and “the body” (193); I argue that toxins are figured as both omnipresent and elusive, outsmarting science, while the body’s precariousness rests upon its permeability and lack of adequate defenses. Medicine has long been understood as the mediating institution, but it fails us now.[31]

Vulnerability and Agency, or, Neoliberalism and the Individualization of Health

On March 24, 2015, the actor and activist Angelina Jolie wrote an Op Ed discussing her decision to undergo an elective oophorectomy, removing both of her ovaries at the age of 39. This article appeared less than two years following her first Op Ed to appear in the *New York Times* written in her new role as a medical advocate, which was published on May 14, 2013. This first article takes readers through the risk calculation she undertook before choosing to have a double mastectomy after genetic testing revealed that Jolie possessed the BRCA1 gene mutation that is understood to have resulted in Jolie's mother's early death from ovarian cancer at an age of 56. Jolie understands her sharing of intimate details of her medical condition in such a public forum as a pedagogical act, and a productive use of her celebrity status to draw attention to what she sees as a lack of knowledge that stands in the way of women's longer lifespans and the prevention of cancer. I am interested in the way in which the Jolie story stands in as a form of evidence for the narrative put forth by the personalized medicine industry: that the cause of disease is heritable, recognizable, and visible through genetic testing technologies and the animating scripts that render genetic code into a set of categories denoting normal and pathological states, the latter of which call for medical intervention.

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[31] To be more specific: medicine fails us in the context of twenty-first century hybrid environmental-genetic forms of disease that cannot be recognized and treated as such because the institution of medicine is still divided into environmental and genetic realms, and thus this institution produces neither the knowledge nor the treatments for hybrid afflictions.

In a way, Jolie acts as a mouthpiece for the industry through the presence of her "empowered but still feminine" body, affirming the common sense notion that the only real obstacle standing in the way of the prevention of disease is our own personal knowledge of our genetic type. If the type and its specific susceptibilities are known, then the impending pathological turns in one's lifespan can be prevented, the narrative goes, now that modern medicine has the necessary procedures and technologies at hand. What is left out of this story? Primarily, the fact that very, very few women possess the privilege and access to health care resources that allow for testing to take place in asymptomatic patients, and especially for preventative surgeries. And secondly, that the assumption of a static, immutable genome that is predetermined from birth and unaltered by its environment, is politically problematic because this assumption—especially when enshrined in an institution that possesses as much cultural capital as medicine does—renders social and economic living conditions irrelevant to health and the development of disease (and unrecognizable as an important—and preventable—cause of disease). This is the strange temporality that genomic medicine assigns to its objects: the body is rendered as an entity that lives in two times at once. The body is understood to contain information that will foretell future disease, a ticking time bomb, but at the same time, the same body holds the key with which the bomb can be defused. In the prevention paradigm, the body and its behaviours present the only tools with which genetic fates can be reversed. Jolie suggests that the question of prevention is simply a matter of personal choice, and even a matter of individual will:

> I choose not to keep my story private because there are many women who do not know that they might be living under the shadow of cancer. It is my hope that they, too, will be able to get gene tested, and that if they have a high risk

> that they, too, will know that they have strong options. Life comes with many challenges. The ones that should not scare us are the ones we can take on and take control of. (Jolie 2013)

How can we know about the mechanisms through which environmental contamination and industrial pollution cause cancer when research dollars are consistently directed elsewhere? How can we know about how to prevent the stress experienced by working class single mothers taking on three minimum wage jobs in an attempt to keep children fed, and the role this chronic stress plays in rendering the woman's body more susceptible to cancer and other disease? Public knowledge about these mechanisms of causation—poverty, stress, resource inequality, environmental contamination, and pollution—in the development of disease and the maintenance of forms of inequality are obscured and sidelined by the dominance of reductive discourses of causation that locate heritable, genetic causation as primary.

Analytical Approach

This dissertation is strongly influenced by a particularly German story of the relationship between race and health. Much of this dissertation was written during the tenure of the two pre-doctoral fellowships I held at the Max Planck Institute for the History of Science in Berlin, located in the former research facilities of Nazi scientists, and just a kilometer away from the train station used to transport victims of Nazi medical experimentation during the Holocaust. Writing in this setting, my dissertation turned to considerations of eugenics—both the scientific theories supporting eugenics and the public perception of eugenics—which pushed my research in new directions and profoundly altered my understanding of the concept of health and the ways this concept is used politically and socially. As a Canadian wading deep into these histories for the first time, it was easy to feel shocked, horrified, and self-congratulatory, gloating about official multiculturalism, the availability of government services in fifteen languages in Canada, etc., especially in light of the continuing neo-Nazi activities in Germany and legislation of racist policies in Germany and many neighbouring European countries. The sense of pride I felt was fleeting, though, as I began to consider how Canadians' self-perception would be altered if the history of the Canadian genocide of Indigenous peoples weighed as heavily on our minds as the history of Nazi genocide weighs on the Germans. What would happen if the Canadian genocide weren't ongoing? What if the story of the Canadian genocide became world-renowned, dramatized through thousands of films, memoirs, and novels, as the Nazi genocide has been?

This would undoubtedly be transformative on a number of levels. One particular change I can imagine would be that Canadians' understanding of health would change profoundly. Though we like to pat ourselves on the back for our health care system, in reality it creates and perpetuates all manner of inequities, not least for Indigenous people in Canada. Continuing forms of colonialism in Canada create daily crises for Indigenous people, yet these are explained away as "self-inflicted," while Canadians go on being shocked by other genocides taking place around the world. Though an attempt towards official acknowledgment of harm done by the federal government was made through the establishment of the Indian Residential Schools Truth and Reconciliation Commission (2008-2015), yet even this Commission and the questions it has raised are squarely placed by the Harper administration, and most popular media, as belonging definitively to The Past, to reparations, and having very little bearing on today's inequalities.[32] Though we often think of it as more complex, Germany's history of genocide is in some ways simpler than Canada's, and it has certainly had far more analysis devoted to it. The phrase "never again" has not been uttered often enough in relation to either the Canadian or American genocide of Indigenous peoples, nor have the political and pedagogical imperatives that this phrase calls for been acted upon in the North American context.

Methodology

My investigation into the way in which political ideologies find their way into and are expressed in the form of state health institutions and policies is methodologically influenced by scholarship in Science and Technology Studies (STS) that directs critical attention towards the role played by, and forms of power streamed through, seemingly banal and inconsequential elements of governance, like standards and metrics. I draw attention to the political work done by standards in the form of public health campaigns, while also investigating the way that particular approaches to the study of health, such as genomics, ascend to dominance as norms. Further, I draw attention to the way that the measurements used to adjudicate qualification within a certain set of standards are not neutral. Scientific measurements are often ex-nominated as political agents, instead understood as technical, and not political, components of a system, and thus outside of the realm of critique. As Gwen Ottinger asserts, though, standards are "if anything, more powerful because they act at an infrastructural level: once standards are established, the sociotechnical judgments they represent recede into the background, becoming visible again only in moments

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[32] The cutting of all funding to the National Aboriginal Health Organization, for instance, took place in 2012, when the Truth and Reconciliation Commission was well underway.

of controversy or as a product of active resistance" (249). This dissertation reveals the sociotechnical judgments cloaked within the increasing dominance of genomics and personalized medicine. I identify these judgments by tracing the assumptions underlying scientific pronouncements concerning causation, heredity, environment, and typology, and assessing how these assumptions comprise each new paradigm as it emerges. This approach also provides a method through which to access knowledges that are marginalized within a paradigm. As Ottinger argues, standards "act to distribute agency among human and nonhuman actors and help determine who can and cannot participate in scientific and policy debates" (249). Standards render a particular form of data legible within a context, but only within that paradigmatic context. One of my research questions for the Canadian context is: which forms of knowledge are not legible from within the genomics paradigm? Which forms of knowledge register as knowledge when measured against the standards of recognition imposed by the genomics paradigm? I direct attention towards marginalized knowledge concerning forms of causation that would hold the government accountable for harm done, including knowledge concerning environmental contamination (Kanouse), climate change (Callison and Kunuk), and links between poverty and disease (Glenn and Stewart). Is it possible to produce a form of evidence and/or knowledge within the genomic context that renders these chronic problems legible and marks them as urgent sites of intervention? Is it possible to draw attention to presence of neo-colonial forms of domination and their effects on environment and health from within a dominant context (and its attendant set of standards) that disavows the persistence of neo-colonial domination?

According to Clarke, Shim et al., the *modus operandi* of Western medicine transformed during the latter half of the twentieth century. The new paradigm of biomedicine that they describe—now well entrenched in 2015—is characterized by "an epistemological and ontological shift from the clinical to the molecular gaze" (Clarke, Shim et al. 22). What are the social and political ramifications of medical researchers, physicians, governments and funding agencies seeing human health through a molecular register? To be sure, human health is decontextualized from its social and political determinants and the mechanisms of causation of disease are obscured.

My analytical approach is Foucauldian in its focus on discursive techniques as articulations of power-knowledge nexus or regime of truth, and I am committed to a form of materialist critique that situates institutions of medicine squarely in a late capitalist and neo-colonial context that allows me to read these institutions' logics as symptomatic of the political-economic logics that inform institutions built in these contexts. Framing political economy as an epistemology helps us consider capitalism as a system of valuation in which particular concepts of biology, heredity, and the determinants of health are articulated through institutional structures, epistemologically, and discursively in order to enable reproduction, accumulation, and expansion. My analytical approach is informed, too, by the STS theory of co-production, first elaborated by Sheila Jasanoff. In Kim TallBear's elaboration of the theory of co-production, she emphasizes the way in which co-production trains our analytical attention to how science and the governing social order of that particular scientific and cultural paradigm are "produced together" (TallBear 49). Science and technology are understood as thoroughly cultural and political, rather than realms that somehow stand apart from the objects traditionally studied by humanities scholars. STS scholars interrogate how "the ideas, practices, structures, and products" of science and technology shape and are shaped by cultural, social, and political orders—and the movement of influence is never seen as mono-directional. Like Foucault's genealogy, TallBear writes, co-production eschews analytical models that seek to describe "discrete origins, linearity, and…universal knowledge" (48). Instead, co-production recognizes the importance of taking contradictions, "untidiness" and "unevenness" as central—rather than exceptional—to an analysis of science and technology as they are "entangled with social norms and hierarchies" (48). This method of analysis encourages a focus on the "social-natural entanglements" themselves, rather than "teasing them apart for the purposes of a clean analysis" (TallBear 54). And "development" in science and technology is never strictly progressive; its missteps and seemingly backward motion merits equal analysis as its apparent steps forward.

A co-productionist approach to the study of the emergence of "personalized medicine" in the context of genomic science departs significantly from other analytical approaches that would frame the problem of personalized medicine as a nascent, "almost-there" project that simply lacks adequate data from which to produce marketable medicine.[33] Many scholars locate personalized medicine on a progressive upward slope that, despite its perceived epistemological virtues, simply lacks adequate genomic data to move forward with full production. My co-productionist approach to the problem of personalized medicine, in contrast, looks to the origins of personalized medicine as well as to the discourses and forms of inequality within which it emerges, is interwoven, and influences with its own political contours. These matrices and discourses include gendered, racialized, and classed forms of inequality, colonialism, indigeneity, neoliberalism, standards of

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[33] This logic is consonant with that of political liberalism, and the idea that an unhindered free market economy will produce ever-increasing freedom, wealth and productivity along with the gradual diminishment of social hindrances to freedom, such as racism and sexism.

evidence in an empirical/quantitative culture, and discourses of personal responsibility.

Foucault's concept of governmentality is a particularly productive one for my analysis in that this concept draws attention to the crucial space in between technologies of the self and technologies of domination. Foucault argues that this is the space in which biopower operates; it is also where I locate the normative discourses of health that underlie the institutions I analyze in this dissertation, including eugenics, public health, race-targeted therapies, and genomic medicine. To analyze the origins and effects of these discourses of health, I look to the cultural norms that render these discourses legible. An important strand of these cultural norms is the influence of neoliberal culture, which enshrines the dynamics of personal responsibility as foundational.[34]

The context within which I situate contemporary health disparities' relation to racial inequality[35] in North America is one of neoliberal colorblindness. As David Theo Goldberg argues, there has been a discursive shift in neoliberalism in which the locus of racism for the modern state has moved from biology to culture. Proclamations of "colorblindness" (in the US) and commitments to official state

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[34] The anthropologist Emily Martin argues in *Flexible Bodies: Tracking Immunity in American Culture from the Days of Polio to the Age of AIDS* that the twentieth century saw a cultural transformation in the concept of immunity that reflects a shift also seen with neoliberalism—a shift from group thinking to a focus on the individual.

[35] References to the concept of race throughout this dissertation should be understood as references to the socially-constructed concept of race rather than as contributions to the racial projects that seek to reify the category of race. Through my discussion of race as social construct, however, I wish to emphasize (rather than minimize) the fact that the lived experience of racialized people and the oppression perpetrated in the name of race is informed by scientific ideas concerning what constitutes race and how these ideas are taken up. I want to acknowledge, then, that race persists as both a category for biological research (based on phenotype) and as a category in social and political life for racialized people (in which case phenotype is understood to reflect genotype, and that both form an indisputable biological racial identity, on the basis of which inequalities have historically been and continue to be perpetrated).

multiculturalism (in Canada, etc.), "the rhetoric of racial democracy in Brazil, and the policy of nonracialism in South Africa," work to "render invisible the racial sinews of the body politic and modes of rule and regulation," Goldberg argues (46). In rearticulating race *through* class, Goldberg argues, the "post-racial" society gestured towards by colorblindness and multiculturalism actually work to cut off access to and legitimacy of language through which to articulate the effects of ongoing systemic racism, the lived experience of race, and the multiple forms of inequality that continue to be perpetrated through racist structures. This discursive silencing also limits the scope of "public analysis or serious discussion of everyday racisms" (Goldberg 56). In a forthcoming chapter, the literary scholar Min Song argues for the discipline of critical race studies as better able to give voice to the type of oppression perpetrated by way of biological-cultural sorts of classification. Song turns back to Foucault's theorization that racism serves an important function in the routine exercise of biopower in that it "is a way of establishing a biological-type caesura within a population that appear to be a biological domain," so that one can then determine "the break between what must live and what must die" (255, 254). Song turns his attention to what, in this theorization of biopower, forms of valuation of life operate in prolonging some lives, and shortening others. Contemporary neoliberal humanism strives to naturalize inequality by imposing a sort of historical amnesia—the fact that race has been used by colonial regimes to divide groups and keep them apart to meet the needs of capital production, and countless other forms of exploitation since then. Song argues that just as the concept of race holds within it the capacity to enact violent forms of oppression, it also holds within it the possibility of naming these forms of oppression; for resistance. Analyses that pay attention to race can fight against this neoliberal amnesia, emphasizing how “inequalities are historically produced rather than naturally occurring” (Song 14).

Structure of Chapters

Chapter One discusses the body of work of the Canadian bureaucrat, public health physician, and eugenicist Helen MacMurchy as a precursor to the logic of personalized medicine through an emphasis on MacMurchy’s own ambiguous treatment of environment and heredity in the causation of disease and other forms of pathology. I focus here on the concern—later framed as the imperative to maximize biovalue—over whether or not populations and races could be “improved” in the context of eugenics, arguing that the field of public health was employed as a social instrument for the management of reproduction at this crucial moment of nation-building. In her prescription of particular sets of behaviours for women, MacMurchy worked to manage the reproduction of deviance by medicalizing the social into the disciplinary mechanism of hygiene, which would be wielded in its scientized form to various ends throughout the next century, thus obscuring knowledge of its status as a tool for social control.

Building on these arguments concerning the role science plays in adjudicating assignments of biovalue to populations as part of state policies that become increasingly tied to economic processes of financialization and speculation as the century wears on, Chapter Two elaborates the concept of “epistemic trafficking” to theorize the development of race-targeted pharmaceuticals as a form of “racial hygiene.” This chapter intervenes in dominant discourses of “diversity” as a therapeutic category in biomedicine, arguing that the mobilization of “diversity” supports the epistemological entrenchment of difference as biological and value-neutral while functionally legitimizing systemic forms of exclusion and oppression in and beyond the sphere of science and medicine.

Chapter Three turns to Indigenous colonial medicine as it operates under the banner of personalized medicine in Canada. This chapter analyzes a public health campaign targeting First Nations, Métis, and Inuit communities, arguing that this campaign operates as a hygiene project in the MacMurchy tradition—only in this case, the hygiene project is disguised for the contemporary context of personalized medicine. The stratification of medical interventions between Indigenous and non-Indigenous communities in Canada reflects a more insidious form of stratification in governance. That is, a different set of criteria for measuring health, and a different set of long-term goals for Indigenous communities than for non-Indigenous Canada.

The dissertation's Conclusion considers the institutional development of genomics research in Canada and its epistemic consequences not only for the production of knowledge about human health, but for other epistemologies and forms of evidence struggling to gain recognition in the Canadian context, particularly Indigenous Traditional Knowledge. My overarching aim for this project is that it will play a role in overcoming persistent barriers to justice in medicine and health by rendering these barriers newly visible, and thus opening them to different forms of scrutiny.

Chapter One: "Canadian Eugenics, Racial Hygiene, and Uncertainty around Causation"

> The Task of Eugenics: (a) to encourage fit and fertile matings among those persons most richly endowed by nature; and (b) to devise practicable means for cutting off the inheritance lines of persons of natural meagre or defective inheritance.[36]
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> If we are to survive, we must live in a world composed not only of differing individuals, but of differing groups. And if we are to adjust ourselves to such a world…we must understand what such differences mean, how they arise, how lasting they are likely to be, which of them are likely to determine our individual and group destinies. In particular…we need to know what differences are inborn and permanent, which result from the kind of upbringing and education people receive—from conditions that we can change.[37]
>
> We cannot give everybody certified milk, but we *must* see that the poor man's milk is good enough to keep his baby alive.[38]

These epigraphs speak to way in which concerns over patterns of heredity and causation of disease found expression and led to very different outcomes when marshalled as cause for reform, or when gestured toward as reasons why a more equitable distribution of resources was sorely needed. The loci of human variation situated along race and class lines, together with measurements of these groups' ability to contribute to society, were mobilized as justification for eugenic practices in the first half of the twentieth century in Canada.

This chapter critically evaluates the eugenic theories, policies, and practices of the Canadian physician Helen MacMurchy with a focus on how her writings betray an explicit calculation of biovalue, which goes on to inform the allocation of resources by the Canadian government. I want to note that I am not particularly interested in

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[36] "Eugenical Classification of the Human Stock," The Second International Exhibition of Eugenics, 1923.

[37] Dunn and Dobzhansky, *Heredity, Race, and Society* (New York: Penguin, 1946) "Preface" i.

[38] Helen MacMurchy, *Infant Mortality: Second Special Report* (Toronto, 1911) 5.

carrying out an analysis of MacMurchy's writings *per se*; rather, I am interested in analyzing what sort of thinking, and what sort of calculations, that the popularity of MacMurchy's writings made possible. This chapter assesses what MacMurchy's readers were ingesting along with her pragmatic child-rearing advice and programmatic schedules for new mothers. What were the politics that accompanied and encapsulated this advice that was then naturalized for MacMurchy's readers as common sense? MacMurchy's rhetorical adeptness allows her to gesture towards an environmental cause for poor health, only then to shift responsibility for such "inadequacies" as chronic illness back to the individual through her prescription of personal hygiene as the proper remedy for problems whose root causes are social. The way in which this clean and seamless shift is made opens up space for MacMurchy's work to naturalize inequalities and absolve the state of responsibility. Further, MacMurchy's politics were not solely circulated through her well distributed texts. MacMurchy's politics played an important role in nation-building and crystallized logics for health policy at a time when policy norms in Canada were still very much in flux. What kinds of policy afterlives do MacMurchy's writings make possible?

This analysis of MacMurchy's politics is complicated by the fact that she was, in some ways, a social progressive, as were many eugenicists of the early twentieth century[39]—a troubling fact that I raise as central to this project that frames the

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[39] Including, notably, the feminist, women's rights activist, tireless advocate for women's suffrage, eugenicist, and proponent of compulsory sterilization Emily Murphy, whose legacy still looms large at the University of Alberta. Like Nellie McClung, whose legacy Cecily Devereux evaluates in her monograph *Growing a Race: Nellie L. McClung and the Fiction of Eugenic Feminism*, Murphy "is in the untenable position of being an agent of a particular kind of social and national work for which she cannot be unproblematically commemorated" (Devereux 11). As Devereux notes, the work of several feminist eugenicists of MacMurchy's era is approached with ambivalence, considered "problematic," yet not entirely disavowed. Referring to McClung, Devereux writes that "[l]ike so many feminists of the first

trajectory from eugenics to genomics as a smoother and more logically consistent one than might otherwise be understood. Though most social progressives today would want to relegate eugenics and its legacies to the dustbin of history, never to be repeated, eugenic thought sprang up from a set of social and political conditions that are remarkably similar to the conditions we face today. And when the production of scientific knowledge follows the values of its funders, it can provide justification for socially and politically disastrous ideas, including that of eugenics. Even in the early twentieth century, though, eugenicists knew that they needed to frame their policies as colour-blind, though the question of race was one of their biggest concerns, and thus a careful analysis of the hidden resonances of racial thinking in eugenics is required (Ittmann). The devaluation of particular communities and lives by eugenicists was developed through scientific studies of how "fitness" was informed by social class (rather than race) and perpetuated through sets of behaviour. Of particular interest for this project is the way in which eugenicists alternated between opposing frameworks for understanding causation and heredity, sometimes conceptualizing it as biological, and at other times as social. The next two chapters examine how this oscillation continues close to a century later in contexts in which medical interventions are tailored for populations deemed to possess a particular sort of susceptibility: African-American and Indigenous communities in the US and in Canada.

While eugenics movements would become much more closely tied with research in human genetics, and epistemologically wedded to the notion of hereditary transmission of traits between generations without much "outside" environmental influence, MacMurchy's interventions tended to downplay the importance of

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wave, she is understood to have paradoxically done 'good' work for many women that is 'bad' because it took place within a framework of cultural imperialism" (11).

hereditary factors in determining health. This chapter analyzes how and when notions of genetic heredity have gained dominance over notions of cultural heredity, and vice versa, asking why eugenicists "looked to science in general and genetics in particular for the solution to intractable social problems" (Paul 268). Though this was part of a broader process of medicalization in which "deviance 'was gradually transformed from a moral to a medical disease'" (Richardson as quoted in Harley Dickinson 389), I argue here that political ideologies of liberalism and neo-liberalism and their abhorrence of ideas of economic determinism and the role that poverty and living conditions have in the causation of disease, have been so influential that they have caused the pendulum of etiological dominance to swing disproportionately in the direction of genetic heredity. I trace the continuities between eugenic and racist policies and the political philosophy of the period, from the heyday of classical liberalism in the interwar years in Canada to the continued primacy of neoliberalism today—both ideologies that led policymakers to "despise" subjects who were dependent on the "care and protection of others" in any way (Paul 268).[40]

The question, simply put, of "nature vs. nurture" that informed concerns addressed by the eugenics movement worldwide was also addressed by scientists. Published the year after the end of the Second World War, Dunn and Dobzhansky's *Heredity, Race, and Society* promises, in its Preface, to "sort out the facts, and present the case of 'nature and nurture' in clear, simple, thoroughly scientific terms" (ix). Much scholarly work over the last decade has been devoted to showing how

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[40] I also want to emphasize that I don't champion ideas of cultural inheritance over those of genetic inheritance as a rule. Though I am excited about the way that ideas of cultural heredity can provide the grounds for a progressive politics and acknowledgment of the role of structural barriers to equality, I am concerned about the regressive and oppressive aspects of a radically environmental etiology that leaves open a space for the downplaying the role of systemic racism (that might be seen as transcendable through epigenetics and other neoLamarckian ideas).

tremendously unclear and fraught the science of genetics was then, and continues to be today. It is important to note that "the exact mechanism which governs heredity" was not at all well understood by scientists or anthropologists in the 1930s or the 1940s. It is important for my discussion of MacMurchy and the heydey of the eugenics movement in Canada that the science of heredity was not at all well understood, and yet was still circulated as a set of certainties that influenced government policy, social norms, and common sense. We are still working today to undo the harm imposed by the profusion and enshrinement of these beliefs in policy and in popular opinion—and not just expressed through racist practices. Looking specifically at the way in which these ideas found expression in medical research and health policy, this chapter aims to illuminate the mechanisms through which a set of relatively esoteric ideas were rendered common sense.

At the outset of their book, Dunn and Dobzhansky state that one of the most important traits of the human species is its heterogeneity. According to Dunn and Dobzhansky, one of the few certainties in the study of human biology is the constancy of difference. Interestingly, Dunn and Dobzhansky go on to argue that the existence of different types of humans is a condition of possibility for the development of capitalism, though they do not explicitly name this political-economic system.[41] I want to emphasize, though, the profound level at which biology is thought through a political-economic lens—a sort of thinking that resurfaces at the heart of each of the case studies in this dissertation. It is important to remember that scientific knowledge is not produced in a realm separate from politics. It never approaches anything like its characterizations of 'objective' and 'detached' suggest; instead, science is co-produced with its political-economic context (Jasanoff). According to Dunn and

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[41] Instead, they employ the depoliticized term "society," marking their aspirations to 'objectivity' and 'universality'.

Dobzhansky, “the facts [of the differences between types of humans] are important because differences among men underlie the conflicts which have shaken the world since history began; and they are also responsible for the great material and cultural progress which has often taken place” (1). Thus we see the opaque reference to one of the dominant justifications made for slavery and other regimes in which the idea of biological inferiority is marshalled as justification for unequal treatment. They go on to write that “the same differences which may lead to conflict also make possible the division of labor upon which civilized society rests” (1). The division of labor is explained as a ‘natural’ process following from a natural division between kinds of biological life, as though particular kinds of humans are better suited to positions of power, and others naturally suited to work in manual labour.[42] What are the mechanisms through which this ‘natural’ categorizing takes place? This was a central preoccupation for Dunn and Dobzhansky:

> …we must understand what such differences mean, how they arise, how lasting they are likely to be, and which of them are likely to determine our individual and group destinies and whether we may be able to overcome or control certain of them. In particular we need to know which differences are inborn and which result from the kind of upbringing and education people receive and from conditions we can change. (Dunn and Dobzhansky 2)

This epistemic gap and its long-standing political importance created space that was—with resounding enthusiasm—filled by genetic narratives of heredity as they

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[42] And, as the upcoming discussion of MacMurchy’s writings shows, the placement of women in the roles of mother and carer were figured and explained away as “natural” by Canadian eugenicists in the early twentieth century. The gendered language of “man” employed here by Dunn and Dobzhansky certainly contributes to the production of the conditions of possibility within which prescribed roles for women could be naturalized.

gained dominance and unrivalled explanatory power in discussions of human difference and inequality. As I elaborate in the subsequent chapters, the dominance of this genetic narrative has resulted in multiple forms of intractable harm. The questions raised by Dunn and Dobzhansky are just as urgent today as they were when this book was published in 1946. When these questions are filtered through genomics and medicine, though, and thereby 'scientized', our ability to respond critically to them is increasingly diminished.

Hygiene and Germany's Life Reformers

To situate my discussion of Helen MacMurchy and the eugenics movement in Canada, I consider an analogous hygiene movement that took place in Germany during the same period, beginning at the end of the nineteenth century. Both Germany's life reformers and Canadian eugenicists, somewhat surprisingly, were influenced by a shared drive for social justice and a desire to overcome class divisions. As I will show, the thought shared by both acted as a discursive precursor to the confluence of race thinking, science, and politics that would forever mark the way in which race and science are considered in relation to one another: Nazi Germany. Strands of this thinking persist today in several different sites of Canadian health policy.

The life reformers' redefinition of health was a crucial normative concept for the Weimar Republic as a new sort of meritocracy where everyone was seen as equally capable of improving their own health. It was during the Weimar period that there was a shift (in both funding structures and social attitudes) towards public health, rather than health care being distributed merely by ability to pay, as it was before Otto von Bismarck introduced the world's first state-funded universal health care system (along with state-funded unemployment insurance and pensions) in the 1880s. It should be noted that Bismarck's establishment of these welfare programs came on the heels of his legislation of Anti-Socialist laws in 1878 designed to limit the influence of the increasingly popular Social Democratic party (Michael Hau). His establishment of the first Welfare State was not understood as antithetical to the measures he took against Socialists in Germany. In the 1880s, the newly established German state was a country seen as significantly less developed than its industrialized peers—France, the United Kingdom, and the United States—comprised largely of a rural, peasant base. As Germany continued to industrialize in the 1880s, it was beginning to lose many of its potential workers to more developed neighbouring countries, where wages were higher. The welfare programs were designed to appeal to the newly emerging middle classes, to convince them to stay and work in Germany. The imperative to expand Germany's economic base and reach development goals informed the new interest in public health focusing on building up the *Volkskorper* ("people's body") as well as the assumption of a preventative approach (rather than a reactive one) through a broader attempt to improve living conditions for the working classes (Hau 374).

At the same time as epidemiologists in Germany were running anti-smoking campaigns to try to improve the health of German workers to support its deeply wounded economy in the 1920s, a widely influential new natural health movement was emerging that was remarkably neoliberal in its ideological orientation. This *Lebensreform* (life reform) movement elaborated practices, ideals, and programs for middle class strivers to follow so that they might attain a state of health that was closely associated with the German bourgeoisie, and, thus, wealth, success, and happiness. In this context, health was not defined in a physiological sense—as the absence of disease—but instead in an oddly moralistic and spiritual sense that was characteristic of the hygiene movement. As Hau notes, “the bourgeois self defined itself through *Leistung*, the ability to perform well and achieve” (Hau 51), and good health was understood as the condition of possibility for the development of *Leistung* (Hau 41). The relationship between health and class was understood as a causal one. The life reformers’ entrepreneurism saw an emerging market for their self-help programs, though, in the middle classes, and began to dangle the carrot of bourgeois subjectivity to attract middle class followers.

The life reformers maintained that the individual body could be cleansed and purified, with all traces of disease disappeared, if that individual gives his or her total commitment to the set of programs and regimens that could produce this eternally sought-after state of health. What is particularly interesting about this movement is that class divisions and structural barriers to both health and wealth were acknowledged, but only insofar as they were identified as markers of disease. The first step for the middle classes in their journey towards health was to recognize structural barriers as transcendable. Before embarking upon the life reformers’ regimens, the middle classes were said to lack *Leistung* only because their lack of commitment to health (in other words, laziness, or ignorance of proper health practices) was impeding their economic success: “the failure to achieve was not perceived as the result of external life circumstances such as blocked careers or business failures. Instead it was seen as a deficiency of the self which was experienced as a lack of health” (Hau 51). The German concept of *Bildung* was also central to the life reformers’ ideology.

The life reformers developed the concept of individual “fitness” which would later become central to the Nazi eugenics programs. “Fitness” referred to an individual's physical health, but it also referred more broadly to the individual's moral and spiritual constitution. As Hau notes, the life reformers believed that "a rational life style that stressed self-discipline and moderation" (28) would not only keep disease at bay, but would also allow for upward mobility, economic success, and happiness.

The context in which the life reformer and natural health movements emerged in the Weimar Republic (1918-1933) is often recognized as the context that gave rise to unprecedented cultural flourishing in Germany. The Weimar Republic saw the emergence of Critical Theory at the Institute for Social Research in Frankfurt (what would later become known as the Frankfurt School), the Bauhaus school, German expressionism, Dada, cabaret, and jazz, to name just a few of the new forms of cultural production arising during this era. While many of these forms of cultural production celebrate the body and explore practices that highlight the pleasures of the body, this counter-balance against the ravages and deprivations of WWI takes on interesting forms in the context of health. An important figure for the life reform movement, Rudolf Steiner, also emerged in the Weimar era. The theories and institutions—Waldorf schools, biodynamic agriculture, and anthroposophic medicine—that he developed remain important in Germany today. The foundational principle that connects these institutions is their holistic approach and a complicated fusing of the biological and spiritual that was typical of health philosophies of this period. The science (often denounced as pseudo-science by its detractors) informing Steiner's biodynamic agriculture practices, for instance, attempts to sync planting schedules with lunar cycles, maintaining that non-empirical factors in growth and production must be considered as equally important to empirically verifiable ones.

While this sense of ideological openness and experimentation that was dominant in Germany and especially Berlin in the 1920s certainly contributed to the popularity of the life reform movement, I argue that life reform flourished in this decade not as an expression of creativity or a new sense of self-expression, but as a strident attempt (whether avowed or not) to achieve upward mobility in a context in which changing one's class had never before been identified as a possibility. This alignment of health with a set of class-specific behaviours is a component of the concept of health that would remain at its centre for the next century. And this normative framing of health as comprised of a set of moral behaviours formed a crucial component of the work of the Canadian eugenicist Helen MacMurchy.

The Canadian Eugenics Movement

Early twentieth century eugenicists in Europe and the Americas sought to deploy new knowledge gleaned by the science of heredity[43] as they designed various programs and government policies through which the reproduction of some groups was encouraged, while others' breeding practices were curtailed (Stern 11). Some of these eugenic programs were strictly medical in design and implementation, and others were conceived as strictly social (Stern 12). Most eugenic programs, however, struck a delicate balance between the medical and the social. As I argue in this chapter, the Canadian eugenics movement—through an analysis of Helen MacMurchy's career specifically—shored up support and achieved wide appeal by promoting itself as a form of 'medicine with a social conscience.' Eugenicists addressed the critical social problems of the early twentieth century—including

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[43] The science upon which eugenic practices were based was later denounced as "pseudoscience" by socially progressive eugenicists who wished to continue practicing eugenics, but distance themselves from association with the Nazi ideology of racial hygiene (Bashford).

poverty, maternal health, infant mortality, infectious disease, and disability—but rather than pointing to broader social and political causes of economic and biological inequality, they narrated the 'pathological site' requiring intervention not as structural but as individual. As I will show, individual practices are identified by eugenicists as mechanisms of causation, and various "hygiene" protocols are prescribed for pathologized individuals as programs of betterment.[44]

As Angus McLaren writes, the "greatest triumphs" of Canadian eugenics took place in the 1930s as "the depression drove a desperate generation in search of scientific panaceas" (McLaren 10). However, it is important to note that scientists—and particularly geneticists—who acted as early promoters of the eugenics movement abandoned the movement after the First World War as research in genetics and heredity progressed and became intellectually and ideologically incompatible with the "simplistic policies" of eugenicists (McLaren 10). Thus, eugenics post-1915 becomes primarily a political movement that is based only loosely on the scientific ideas that inspired its initial development. I argue, however, that the policies of Canadian eugenicists—with a focus on MacMurchy's policies, specifically—were not at all simple. Instead, these policies, and the writing and public health campaigns that introduced them, were complex, rhetorically sophisticated, and, at times, self-contradictory. Without these qualities, eugenic policies would not have gained such wide support.[45] As McLaren notes, eugenic ideas gained the status of common sense

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[44] And, as Chapter Three argues, medical assessments that prescribe hygienic practices as treatment for existing health problems implicitly shift the responsibility for these health problems to the patients themselves, suggesting that these problems would not have occurred in the first place if these individuals had taken better care of themselves.

[45] As Alexandra Minna Stern chronicles, North American eugenicists wanted to forge a separate path for themselves in the 1930s and 40s to disassociate themselves from the tenets of racial hygiene that became so central to the Nazi regime in Germany. She notes that American eugenicists "began to distance themselves from overt

in Canada in the 1930s, and their proponents managed to "populariz[e] a vocabulary and terminology that even their opponents employed" (McLaren 11).

Many eugenic policies were profoundly ambiguous—if not in intent, then certainly in their iterations and in their effects—in that the practical outcome of the policy would align with eugenic imperatives, while also appealing to social justice priorities. This ambiguity ensured the broad appeal of eugenics to government policymakers, medical professionals, and, crucially, the public (especially in the form of its growing support base found in middle class Canadians). The ambiguous approach of eugenic policies often entailed the measurement and/or identification of a socio-medical problem or phenomenon that could be characterized as caused by the environment or a structural form of inequality, but the policy was often complex enough that this characterization would transfer the responsibility from the expected state agency to the individual, often through the invocation of a self-maintenance practice such as hygiene. For example, MacMurchy ordered the first census of developmentally disabled[46] people living in Ontario in 1905, ostensibly to collect data on the number of people requiring government support, so that she could develop policies that would ensure for their proper care (McLaren 107). From this angle, this was a policy that appealed to social progressives who wanted to see the government

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hierarchies and rankings, particularly those based on race and class, which were rejected as simplistic and anachronistic" (Stern 152). Thus, eugenic ideas in North America began to be expressed through a less easily recognizable form so that the eugenic movement would not lose support. It is for this reason that such a subtle reading of eugenic writings and practices is required. As I argue, the legacies of eugenic thought become less and less recognizable as such as the twentieth century wears on, but they do persist, especially in government policy.

[46] To use MacMurchy's terminology, these people were characterized as "feeble-minded." According to McLaren, MacMurchy was particularly concerned about the breeding practices of the "higher-class mentally retarded who could be mistaken for the normal" (107). Her book *The Almosts* addresses what she sees as a pernicious problem in that potential partners of the "feeble-minded" might unwittingly produce more "feeble-minded" Canadians in cases where the individuals' supposed degeneracy was too subtle to be noticed.

provide increased social services to its populace. However, it became clear in subsequent years that MacMurchy's intention for the census was to produce data to argue for government funding of asylums that would physically remove the "feeble-minded" from the communities in which they could reproduce. Further, MacMurchy's long-term interest in producing data on the number of "defectives" in society was designed to help shore up ongoing support for the eugenic cause more generally in the sense of its mission to biologically improve the human race (McLaren 107).

I want to emphasize that in the 1930s, the aims of the eugenics movement were not yet understood to be at odds with those of progressives and socialists who wanted to see structural reform to alleviate poverty and the unequal distribution of disease. The rhetorical and ideological flexibility of the eugenics movement resulted in the production of seemingly unlikely eugenic disciples, including Tommy Douglas, and lent its ideas the staying power to continue to influence government policy in Canada for more than a century. Before becoming Premier of Saskatchewan, Douglas studied theology at Brandon College, going on to undertake a Master's degree in Sociology at McMaster University (McLaren). Douglas' M.A. thesis, "The Problems of the Subnormal Family," was completed in 1933 and explicitly promoted the government adoption of eugenic policies limiting the reproduction of "defective" members of society (Young). Eugenic theory, then, was wholly compatible with Douglas' socialist politics and the social justice mission he worked to carry out as a Baptist minister and community organizer. Though he distanced himself from the eugenics movement later in the 1930s, it is important to note that Douglas—the beloved "Father of Medicare" who was voted "Greatest Canadian" by a Canadian Broadcasting Corporation vote in 2004—enthusiastically supported the eugenics movement during MacMurchy's heyday of the early 1930s. Below, a photograph taken in a Princess Margaret Hospital clinic room points to the enduring—and for me, still inspiring—legacy of Douglas' vision. It is precisely because of the frequency with which such contradictions occurred during my research on eugenics in Canada—that its intentions and outcomes were so profoundly mixed, and did indeed inform some of Canada's most progressive political developments together with some of its most discriminatory and harmful—that I believe further study of Canadian eugenics history is needed.

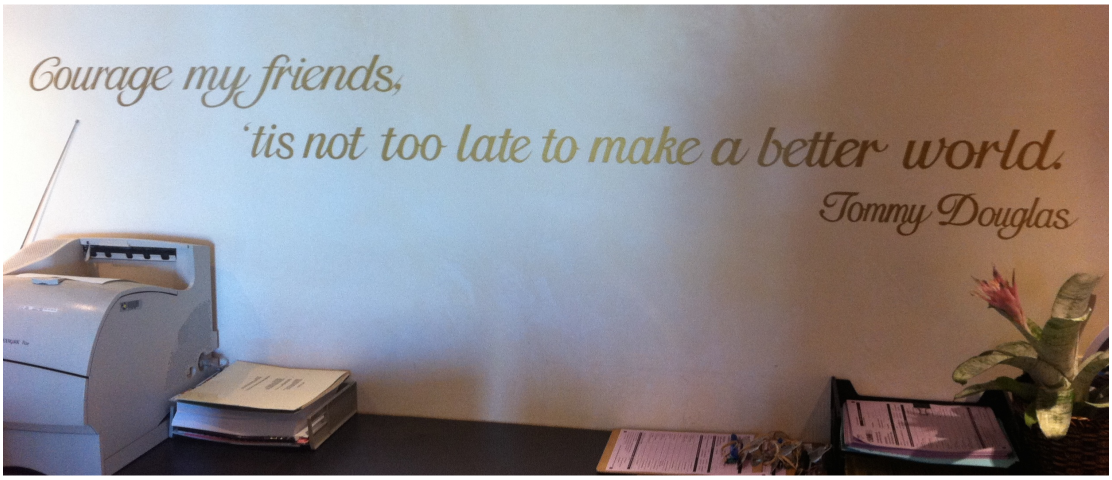

Figure 1. The intertwining of eugenics and Medicare in the history of Canadian health policy: a nod to Douglas' legacy at the administration and check-in desk at the Pencer Brain Tumour Centre at the Princess Margaret Hospital, Toronto.[47] Douglas' words here, too, are ambiguous. Though written to gather support for the passing of Canada's first universal health care legislation, these words could indeed be informed by the eugenic promise of improvement that comes at the cost of the devaluation of some lives to allow for the betterment of others.

The legacies of eugenics in Canada are sometimes hidden in plain sight. The methodology I have employed in this project is informed by this location of the legacies of eugenics underlying today's common sense, and continuing to speak from within today's health policies. My aim here is akin to that articulated by Priscilla

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[47] Photograph taken with permission by Sarah Blacker.

Wald in her recent critical genealogy of the Anthropocene: an effort "like Benjamin's historical materialist, to recognize the assumptions fuelling unwitting repetitions" (Wald 14). It is such articulations of the "absent presence"[48] of eugenic ideas of betterment and devaluation that I trace in my analysis of public health campaigns.

MacMurchy's Public Health Policies

MacMurchy attended medical school at the University of Toronto as part of the second class of women ever admitted to that medical school in Canada, earning her degree in 1901. She was the first woman accepted by Johns Hopkins University medical school for post-graduate study. It is significant that MacMurchy rose to prominence as a doctor and as a bureaucrat at a time when both fields were overwhelmingly male-dominated (MacLaren 30). In 1919, amidst growing government anxiety over the number of Canadians killed in WWI, a low birth rate, and high infant mortality rate, the Canadian Federal Department of Health established

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[48] By invoking the phrase "absent presence," I am thinking with the work of the scholar of black Atlantic, diaspora, and settler colonial studies Phanuel Antwi, whose forthcoming book traces the "absent presence" of blackness in eighteenth and nineteenth century Canadian texts, including novels, immigration pamphlets, and settler guides. While the presence of black people remains unmentioned and unacknowledged in the texts Antwi analyzes, the products of slave labour—in the form of cotton clothing—play an important role in these works. Antwi frames his argument within the context of a settler colonialism that registers and values natural resources above some human lives—a tendency that I argue continues to inform Health Canada's public health campaigns that devalue Indigenous lives today. Antwi's work has been instructive for this project, too, in its method of reading for absence. His work is attentive to the ways that colonial policies and literatures act as "sites of pedagogical and spatial containment" (4) as they "move around" black people in order to "avoid them" or to avoid acknowledging their presence (5). Antwi's method is to hone in on sections of the text where "actively disavowed presence" is "coded in the language and forms" of the texts analyzed (5). Antwi's discussion of "absent presence" is informed by Dionne Brand's groundbreaking work *Bread Out of Stone: Recollections on Sex, Recognition, Race, Dreaming and Politics*, which posits an "absent presence" that is "at the core of Canadian identity" (139). Canadian culture and literature, she notes, are premised upon erasing and obscuring the "difficult" presence of non-white people in Canada.

a Division of Child Welfare in 1919, appointing Dr. Helen MacMurchy as its Chief (a position she held until 1934). MacMurchy was an active participant in the international community of eugenicists at the outset of the twentieth century, attending the Second International Congress for Social Hygiene in London in 1907 as well as the Third International Congress for Social Hygiene in Paris in 1910 (McLaren 180).

MacMurchy was a prolific author, publishing a plethora of government reports, as well as books geared to the lay public. MacMurchy published her first "Special Report on Infant Mortality" in 1910, to be followed by a second "Special Report on Infant Mortality" in 1911, and a third "Special Report on Infant Mortality" in 1912. As McLaren notes, MacMurchy's reports on infant and maternal mortality registered as alarming enough that the Canadian Medical Association called for a national inquiry on infant and maternal mortality rates to be carried out in 1925—quite belatedly, that is, more than a decade after the publication of MacMurchy's last report on infant mortality (McLaren 33). MacMurchy's report, *Maternal Mortality in Canada*, was published in 1928. She also published annual reports on the "state of feeble-mindedness" in Ontario each year between 1907 and 1918 (McLaren 39). During the 1920s, MacMurchy made a significant contribution to the growing genre of liberal self-help literature, with the publication of self-help manuals on various topics. These titles, comprising three series of "Little Blue Books," include: *The Baby's Father* (1918), *Healthy, Happy Womanhood* (1920), *The Almosts* (1920), *How to Make Outpost Homes in Canada* (1923), *Canadian Mothers' Book* (1925), *Canadians Need Milk* (1927), *How to Build the Canadian House* (1927), *How to make our Canadian Home* (1927), *How to Take Care of the Baby* (1927), *Beginning a Home In Canada* (1928), *How to Avoid Accidents and Give First Aid* (1928), *How to*

Manage Housework in Canada (1928), *How to Take Care of the Children* (1928), *How to Take Care of the Father and the Family* (1928), *How to Take Care of the Mother* (1928), and *How We Cook in Canada* (1928).[49] Her final publication was *Sterilization? Birth Control?: A Book for Family Welfare and Safety* (1934).

As she was a public health physician employed by the Division of Maternal and Child Welfare with the explicit task of decreasing infant mortality rates across Canada, it is not surprising that the majority of MacMurchy's interventions engage with hygiene practices and environmental conditions that determine human health. What is not self-evident, though, and has not yet been addressed by scholars of health policy in Canada, is the way in which MacMurchy's mobilization of the discourse of hygiene and environment profoundly shifted this discourse, such that we are still grappling with the legacies of this shift today. Even through a contemporary analysis, MacMurchy's policies were ambiguous and her politics subtle enough that her career does not register as clearly and wholly racist and condemnable. For MacMurchy, much was at stake in her quest to define "the normal" and "the deviant" so that she could dictate measures to direct the nation's reproduction (McLaren 45). Her argument for the sterilization of the "deviant" employed an economic logic. Without sterilization, MacMurchy wrote, "good citizens" would be drained of their means through their obligation to pay for the "subnormal" and their "lawlessness, dependency, ill-health, and incapacity" through high taxes (MacMurchy *Sterilization? Birth Control?* 5).

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[49] While MacMurchy's publication of numerous self-help manuals written for women suggests her allegiance to the priority for first wave feminists of educating women (as well as the publication of women authors), MacMurchy's feminism does not otherwise align as closely with that of Canadian first wave feminists and eugenicists Murphy and McClung. While Murphy and McClung fought for women's suffrage, MacMurchy's work actively sought to limit the possibilities for women's participation in public life beyond the role of motherhood.

The overwhelming focus of MacMurchy's work, though, was to choreograph the science of public health in such a way that responsibility for all forms of "deviance," including disease and poverty, would rest with the individual and not with the state. As McLaren argues, MacMurchy maintained that "[s]ociety was not responsible for the nation's ills; individuals were" (31). While MacMurchy devoted an enormous amount of time and energy to the writing of self-help manuals through which the afflicted could improve their standing, some of her writings reveal her belief in a profound and permanent divide between the favoured citizens and those who are doomed to pass along various forms of "inadequacy" and "deviance" to subsequent generations (McLaren 31-36). It is MacMurchy's belief in an unbridgeable biopolitical fracture, though never articulated so explicitly, that I argue undergirds the humanitarian gesture made by MacMurchy's self-help books, as well as other forms of personalized medicine that follow, including race-specific medicine and public health campaigns directed towards Indigenous communities. That is, these efforts are not made in good faith or believed to be measures that can correct disparities; instead, they serve to distract and to shift blame onto pathologized individuals.

While MacMurchy's politics differed from those of her contemporaries Emily Murphy and Nellie McClung in many respects, all three enthusiastically subscribed to the politics of maternal feminism in the context of their advice literature directed to women. As Cecily Devereux notes in her description of McClung's politics, maternal feminism "built its case for the female vote on the basis of a conception of women's moral superiority to men that was understood…to be a direct and inevitable result of sexual difference and an effect of a biologically explained maternal instinct" (20). Maternal feminism sought to undermine various forms of patriarchal domination through an emphasis on these essentialist notions of sexual difference and women's supposedly innate maternal practices of care and stewardship—a focus resolutely located beyond the masculine ego that was imagined to restrict men's capacities in a nurturing and generative role (Devereux 20-21). As this notion of women being "inherently motherly" was naturalized by maternal feminism, though, an epistemic space was created within which other forms of essentialism and biological determinism could gain epistemic prominence and be rendered as new social norms. Through an analogous logic to that through which women were framed as "morally superior" to men, the eugenicists' arguments concerning other forms of "biological superiority," including "racial superiority," were similarly naturalized.

MacMurchy's Concept of Cultural Heredity

> There is not very much difference between the murderer and the one who stands by and sees those die whom he could save. The infant mortality rate must be reduced, beginning in the cities. (MacMurchy 1911, 54)

For Canadian policymakers in the interwar years, the appeal of eugenics lay in its amenability to the national project of building up the population with those who were expected to "contribute to" rather than "drain" state resources. Eugenics in Canada was initially an economic project that sought to cement a certain class hierarchy through the production of legislation around reproduction and immigration that would result in the proliferation of the "right" kind of citizens and thus a stronger economy. Questions of deviance and pathology were, and continue to be, of central importance to any nation-building project. Identifying the mechanisms of causation that would result in 'pathological' traits was an important precursor to biopolitical control. Canadian eugenicists, together with Canadian physicians, maintained "that there were limits to what could be accomplished by social improvements, and, thus, measures to control and engineer heredity must be taken" (McLaren 29). In this period, then, when the relative risk of heredity and environment were weighed against each other as causal criteria in the formation of desirable/undesirable Canadian subjects, heredity overwhelmingly tipped the scales.

I situate my analysis of MacMurchy's engagement with the two competing concepts of causation—heredity and environment—in the context of the history of the life sciences, and, specifically, the field of genetics that was emerging during the period she wrote and published her three "Special Reports" on infant mortality in Canada (1910, 1911 and 1912). The first scholarly journal in the field of genetics research appeared in 1916, though the term "genetics" was coined a decade earlier in 1905, and the term "gene" in 1909 (Keller 4). The term "genome" was coined by Hans Winkler, and has been in use since the 1920s to describe the hereditary material contained within an individual organism (Radin 19). In its original context in the Greek language, "genome" could be translated as "I become, I am born, to come into being" (Radin 19). During this period, the particular mechanisms through which this hereditary information contained within the body actually worked to produce a phenotype, including medical conditions, was not well understood. While the term "gene" first appeared in 1909, the first theorization of the gene's functionality in the human body was not published until 1940 (Keller 17). The "one gene—one enzyme" hypothesis was followed thirteen years later by the discovery of DNA in 1953 (Keller 17).

As Evelyn Fox Keller argues, Watson and Crick's most important contribution to the history of genetics is not merely their discovery of the precise mechanisms through which genes and enzymes function on a molecular level, but the metaphors of "information," "program," and "instruction" that the biologists used to describe their objects of study and the role played by genetic material within the human body (Keller 17-19). In the context of the 1950s, when "information theory" was rising to dominance in communications, as Keller notes, concepts of information as a sort of "linear code" were circulating in the collective consciousness of intellectuals of the period, and were ripe for migration into other intellectual contexts, including that of molecular biology (Keller 19). When genetic material was introduced as "informational" in character, though, this definition "stuck" and was not recognized as a metaphor (Keller 19). The problem was that this concept of "information" is indissociable from its programmatic connotations properly describing the way that information functions in computer systems. This is the idea that information functions and produces particular results with total control from its original programming, and without influence from external factors such as environment. Genetic material came to be understood as programmatic in the sense of a computer program, which would operate the exact same way and produce identical results, regardless of its social and material environment.[50] The enthusiastic embrace of this metaphor of information led to an understanding of genetic material as hermetically sealed off from its environment; that human phenotypes (including susceptibilities to disease) were pre-determined by the content of their genetic 'information' even before birth. This metaphor then led to the common-sense adoption of the idea that nothing could be done during an individual's life course to alter this genetic 'fate'.

It seems surprising now that this characterization of the behaviour of genetic material was believable at the time, and even more surprising that this provisional

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[50] The sort of fuel that supports the environment in which the information carries out its 'program' was also understood to be uninfluential. Today, however, new research in metabolism science shows that the type of food ingested is highly influential to the content of the 'information' produced by an individual system (Landecker).

metaphorical description rose to the status of unquestioned norm. Humans are a profoundly relational species and a great deal of biological evidence existed in the 1950s that pointed to human phenotypes' environmental malleability. However, as I argue, the political stakes of locating the causation of human disease in the heritable realm, rather than the environmental and socially-determined realm, were high. It is specifically in relation to this question of how scientists and public figures whose declarations significantly influenced public opinion narrated the causation of disease, that MacMurchy emerges as such an important figure for understanding the genealogy of these ideas in the Canadian context.

During this same period in the United States, the industrialist responsible for automating and standardizing factory production, Henry Ford, extended his penchant for standardization beyond the factory walls and into the homes of his employees. Ford's desire to maximize the productive capacities of his employees, thus increasing the corporation's production of profit, led him to consider factors that might be hindering his employees from producing more and working harder. Though Ford didn't concern himself excessively with possible health risks for employees within the factory site, he began to consider how employees lived their lives when they were not working and the impact of these lifestyles on their performance at work (Banta). That is, how certain "risky" behaviours might curtail employees' productivity and even cause disease. As Emily Martin chronicles, Ford sent more than "one hundred investigators" into the homes of his employees, and these investigators "admonished them to practice thrifty and hygienic habits and avoid smoking, gambling, and drinking" (30). Those workers whose living conditions did not meet the hygiene standards sought by the health inspectors "were not eligible to receive the full five-dollar wage that Ford offered" (Martin 30). Ford's employee surveillance practices were informed by the racist assumption shared by eugenicists of this period that non-white workers' hygiene practices were likely to be sub-par and would require reform. As Martin writes, Ford's health inspectors "target[ed] worker families of foreign birth" and "deplored foreigners' predilection for 'dark, ill-ventilated and foul-smelling' rooms, and their disregard of the cardinal virtue of cleanliness practiced by 'the most advanced people'" (Martin 30).

This systematic intervention into a population's health—in this case, a population of workers—is a type of eugenic practice. Many corporations operate analogous practices today in the form of various interventions into their employees' lives outside of work[51], though these interventions are not usually recognized as eugenic in nature. It is this question of how interventions are legitimated, and how the proper locus of intervention is decided upon, that I turn to now. It is the latter concern that determines the shape of populations "tweaked" by eugenic policies, and has been debated in different fora for more than a century.

During the interwar years in Canada, eugenic ideas were expressed in two separate (yet inextricable) streams: the first articulated an anxiety about the effects of genetic heredity, and the second attempted to control what was understood as 'cultural heredity'. 'Undesirable traits' were understood as reproduced through both mechanisms. Forced sterilizations addressed both, as many who were forcibly sterilized were seen as unfit parents *both* because of the risk of the inferior genetic traits being passed along to offspring *and* because of the perceived 'cultural or social deficiencies' that would then shape the development of their offspring in negative

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[51] Indeed, contemporary capitalism has produced forms of precarity and surveillance of workers that by comparison paint Fordist interventions in a benevolent light. Consider, for instance, the new norm in the "flexible" labour market of offering employees "zero-hour" contracts that do not guarantee any work or benefits at all, as well as increasingly ubiquitous corporate surveillance of employees' health and attendant forms of discrimination.

ways. The Canadian government operated primarily on the basis of a logic of cultural heredity: running a number of institutions that were designed to "excise" what were deemed the "pathological" elements and cultures from the nation.[52]

During the interwar years, government policies were designed to respond to resource shortages as well as prevent future shortages. In this sense, as Karl Ittmann argues, Canada behaved as a colony—more specifically, a Dominion—of Britain as well as colonizer of its Indigenous peoples. The British Empire, Ittmann notes, was concerned about food shortages in its colonies and wanted to ensure that Canada's agricultural output remained steady (64). For the British Empire's colonial government, the "relationship among reproduction, labor, and resources in the empire" was crucial (Ittmann 64); for eugenicists in Canada, this meant that the 'right' Canadians needed to reproduce at a high rate to ensure adequate labour power, and 'pathological' reproduction needed to be curtailed to prevent the loss of already-scarce resources. The field of public health offered a pliable social instrument through which reproduction, labour, and resources could be managed in the colonial setting. For MacMurchy, the ideal entry point through which to manage reproduction, labour, and resources was one that was perceived as unrivalled in its malleability and accessibility: the social mores of women, scientifically configured as practices of hygiene.

Heredity and Hygiene as a Tool for Social Control

Understanding the eugenics movement in Canada in the interwar years—as well as the ways in which this movement carries on today—requires an understanding

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[52] Canada has long operated under the foundational myth of being infinitely welcoming, having achieved international recognition as the first state to pass an Official Multiculturalism Act (in 1988). However, hierarchies based on biological ideas of variation continue to exist and are still enshrined in Canadian law today. I draw attention to the moments when race is *not* named as the site of intervention, but instead "culture" is used as a sort of PC euphemism for "race."

of the evolutionary theory/scientific ideas about heredity that informed the public policy and law-making of that period. It is important to note that until the 1940s, most biologists *did not* make a hard distinction between genetic heredity and cultural heredity. Most were open to what we now know as epigenetics, including Helen MacMurchy.

As Alison Bashford and Philippa Levine write in their Introduction to *The Oxford Handbook of the History of Eugenics*, the etymology of the word “eugenics” combines “*eu* (well or good) and *genus* (born)” (Levine and Bashford 17), thus originally emphasizing the particular set of traits already possessed by an individual at the moment of their birth. In other words, the concept of heredity is at the heart of eugenics. However, as Bashford and Levine note, eugenic practices were carried out under different names in different parts of the world, sometimes reflecting significant ideological variation between national contexts. In Latin America, eugenic practices were carried out as practices of “homiculture,” and in France, as *puériculture*—both approaching the Lamarckian and retreating from the Darwinian concept of heredity (17). These terms both emphasize the importance of the developmental environment to subject formation, and in these contexts, the prescribed practices centred around optimizing “infant or child health, or methods of rearing and training children” (17). Homiculture and *puériculture* bring the developmental environment to the forefront: “with a sense of active tilling and tending,” the use of these agricultural terms in the context of eugenic practices “held a more social meaning than the biologically oriented ‘eugenics’” (17). The emphasis on practices of cultivation and care certainly rendered the eugenic movement more accessible to the public, and especially to mothers, whose roles were held in the highest esteem by this movement. This shift away from an emphasis on the circumstances of birth and a strict form of race and class essentialism, and towards the circumstances and resources that determine health was a welcome change, though this move away from determinisms also opened the door to neoliberal thought and the placement of all responsibility on the individual, thereby absolving the welfare state of responsibility. At one end of the spectrum of ideas about the biological mechanisms of heredity is Francis Galton, who argued that the genetic line was sealed off from the developmental environment. For him, evolution occurred through random mutation and recombination, though he acknowledged there may be a separate inheritance path that is behavioural (Ittmann). At the other end of the spectrum, Lamarckianism understood environmental circumstances as the primary determinant of variation—crucially, in a non-random way.

MacMurchy's work as a proponent of sterilization is informed by the Darwinian idea that the traits that lead to poverty (and various types of pathology) are in the genome. This means that education, welfare programs, and public policy are moot because these traits will continue to be passed from generation to generation through genetic inheritance. Under the terms of this theory, reform is not possible at the genetic level, leading policymakers like MacMurchy to consider sterilization as a method of putting the inheritance of unfavourable genetic traits to an end.

MacMurchy was also influenced by the liberalism that found expression in biology—for instance, through the thought of Herbert Spencer, for whom genetic reform *is* possible, but only through striving (Eghigian, Killen, and Leuenberger). We see this logic rearing its head in today's neoliberal politics and ideology: the idea that if the social safety net is removed, people will develop adaptations and climb out of poverty. In this view, public policy must be designed to promote striving, or else it will promote stasis. This is classical liberalism: the primacy of the individual over the collective, freedom of choice, and the model of what Foucault calls "the entrepreneur of the self" --the development of the self as the product to bring to market, in a context in which all phenomena are reduced to calculation for the purposes of market exchange. This sort of liberalism (and now neo-liberalism) rejects deterministic ideas of any kind—both genetic determinism and cultural determinism—and strongly influences MacMurchy's ideas in the public health arena. This philosophy needs to reject the idea of determinism in order to further its argument that each individual is responsible for their own failures; the circumstances of birth do not play a deterministic role. This idea of equal opportunity, a meritocracy, prevents acknowledgement of the structural barriers to equality that have operated and continue to operate through—for example—racialization as a modality of oppression. In neoliberalism, there is thought to be *no* biological or economic stricture whatsoever: what you want to become, you will become, if you work hard enough (not just in the sense of the Protestant work ethic), but also through creativity and innovation.

This anxiety about the social and political effects of cultural heredity is still alive and well today. Paul Ryan, Republican politician and Chairman of the House Budget Committee in the US Congress since 2011, gave an interview on March 12, 2014 on the topic of welfare reform in the US. In this interview, Ryan acknowledged that unemployment and the number of families living under the poverty line in the US are continuing to rise, and that the anti-poverty initiatives in place don't seem to be working. By way of explanation, Ryan cited Charles Murray and placed blame directly on those living in poverty, suggesting that these individuals possess a particular trait that works against the anti-poverty initiatives in place. Ryan said: "We have got this tailspin of culture, in our inner cities in particular, of men not working and just generations of men not even thinking about working or learning the value and the culture of work, and so there is a real culture problem here that has to be dealt with" (cited in "Think Progress" article, March 12, 2014, p. 1). Ryan later retracted these comments after they were decried by the media as racist and as a classic instance of scapegoating, but such comments are hardly unusual for either the US Republican party or a whole host of far Right political parties gaining support internationally in the past few years. In Ryan's case, commentators argued that Ryan knew he couldn't name any specific group explicitly, so instead used the phrase "inner city culture" as a euphemism for "African-American." I point to Ryan's comments in particular because he employs this Social Darwinist rhetoric concerning the perceived dangers of a *cultural* sort of heredity.

This slippage through which the stubborn persistence and ostensible immutability of culture is framed as analogous to that of genetic inheritance is not new. The identification of culture as locus of difference has long offered a 'safe' and politically correct haven for eugenicists and neo-eugenicists to avoid accusations of racism. Just as culture becomes the villain for neo-eugenicists such as Ryan, a subtle but incisive framing of the stubbornness of cultural inheritance was also crucial to MacMurchy's project. It is this sort of description and identification of instances of cultural heredity, as well as the measures articulated as necessary to counteract the forces of cultural heredity, that I will now discuss in the context of MacMurchy's writings.

Promoting a particular set of reproductive practices that would result in the production of what she called the "ordinary Canadian baby," MacMurchy was extremely concerned about the possibility of what she called "race suicide" in Canada. And for MacMurchy in this context, "race suicide" refers to the "degeneration" of human health and intelligence through unmanaged breeding—that is, allowing for the proliferation of "undesired" traits to outpace the reproduction of those considered "most fit" for reproduction (McLaren 31-44). MacMurchy argued that the nation desperately needed more "infant soldiers" to repopulate its vast lands (she, like other eugenicists of the period, was very fond of military metaphors). War posed a significant problem for eugenicists because it inverts their prescribed reproductive practices: in wartime, those possessing the traits most desired by eugenicists to be passed on to future generations can be killed and maimed, while those who are considered unfit for various reasons remain at home and continue to reproduce (Ittmann 9). According to MacMurchy, Canada faced an enormous challenge in the interwar years after "its 'best' had died in war in Europe, while its 'worst' and least fit were breeding at home in Canada." Much of MacMurchy's work aimed to remedy this, and her reliance on military metaphors, including her focus on the figure of the "infant soldier," betrays the heavy saturation of wartime logics in her thinking.

As a bureaucrat and eugenicist, MacMurchy wrote reports for the Canadian federal government "offering a 'scientific' explanation for many social problems," providing "the rationale needed to pursue an ameliorative program of reform that did not challenge the socio-economic structures of society" (Dodd 209). MacMurchy's advice manuals were sent to every mother in Canada who registered the birth of her child. It is estimated that around one third of all Canadian mothers received one of MacMurchy's manuals in either English or French (the books were not translated into any other languages, including Indigenous languages) (Dodd 211). MacMurchy identified women's work—particularly child-rearing and domestic work—as crucial to a larger biopolitical project that held the potential to populate the nation with "vigorous" subjects who would contribute to, rather than "drain," state resources. This logic is consistent with that of eugenic maternal feminism as a "discourse within which white, middle-class, Anglo-Saxon women" were called "to constitute themselves as national—racialized—subjects in superior relation not only to women (and men) of other nations but to other categories of national womanhood such as indigenous, working-class, and immigrant women" (Devereux 38). MacMurchy's unrelenting arguments for sterilization—specifically targeting those "inferior" subjects—played an important role in the passing of Canada's first Sexual Sterilization Act[53] in 1928 in Alberta, where forced sterilizations would continue until 1972.[54] As Erika Dyck shows, those most affected by sterilization policies included people with developmental disabilities, recent immigrants, orphans, and First Nations and Métis women.

In 1911, when there was enormous racist and nationalist anxiety about the ethnic character of Canada, MacMurchy wrote in her *Special Report on Infant Mortality*:

> One out of every five of the children born in the City of Toronto is carried out of the home in a little white coffin before the year is out… And this in a country where there is much room and much need for new citizens. The best of our new citizens are our children. The potential value to the country of these lives, which might easily be

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[53] The history of eugenic thought and of sterilization practices that took place in Alberta and in British Columbia has been well documented, particularly by the "Living Archives Project on Eugenics in Western Canada," a five year project funded by the Community-University Research Alliance program of the Social Sciences and Humanities Research Council of Canada (SSHRC) and run by Rob Wilson at the University of Alberta.

[54] I also want to note that there was no universal Medicare in Canada until 1966, which means that in the interwar years, the lack of access to and affordability of medical care for the working classes, both in cities and in rural areas, functioned as a strong determinant and striator of health.

> saved by proper maternal and medical care, is beyond price or computation. (3)

When MacMurchy calls the babies of Toronto the nation's "best" citizens, she is specifically referring to white Canadians of a European background.[55] MacMurchy worked tirelessly to implement the mandatory medical inspections of immigrants arriving in Canada in the 1910s, while arguing that immigrants were "more susceptible to feeble-mindedness" and that these individuals should be sterilized (McLaren 51). The potential societal costs of the reproduction of the "feeble-minded," she believed, included "poverty, unemployment, alcoholism, and prostitution" (McLaren 51). Though she takes care not to publish many explicitly racist statements, the attempt at a more "objective" description that runs throughout these policy documents is in a way *more* insidious.

The Colonial Logic of Eugenics in Canada

To give context for what I describe as this particularly racist form of nationalist anxiety, I will briefly discuss the types of institutions developed in this period in Canada with the explicit aim of homogenizing the nation—at least culturally, if not "ethnically." In its governance of Canada as a new nation, the federal

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[55] As Devereux shows, the focus of many eugenicists' interventions was not to improve living conditions for those living in poverty in order to improve the health of their descendants. The eugenicists were hereditarians, after all. Instead the eugenicists directed most attention to what were seen as the "better breeders" who were being lured away from motherhood by other pursuits. For MacMurchy, these "better breeders" were white, middle class Canadians. A great deal of energy was spent trying to entice these women back to motherhood so that their qualities of selflessness, hard work, and commitment could be passed along and become dominant features of the "Canadian race." As Devereux notes in her discussion of the British eugenicist C.W. Saleeby, much of eugenicists' efforts and advice manuals were directed towards "educated white, middle-class women who…were 'increasingly deserting the ranks of motherhood and leaving the blood of inferior women to constitute half of all future generations'" (Devereux 37).

government established institutions and practices that would help to ideologically cement new nationalisms—especially class and race hierarchies—and eugenics policies ensured that these hierarchies were reflected as much as possible in the social and biological reproduction of Canada's citizens. First, the federal government established 130 "Indian Residential Schools" across the country with the aim of completely assimilating the nation's Indigenous peoples—with the idea that Indigenous culture could be eradicated within a few generations of institutionalization. First Nations, Métis, and Inuit children were forcibly removed from their family homes and taken to these institutions, where they were converted to Christianity, taught English and French, and punished if they were heard speaking one of their own Indigenous languages. The residential school system expanded in the interwar years, peaking with its greatest numbers in the 1930s.

A great deal of abuse took place at these institutions, including scientific studies that were carried out on the children without the consent of the children or their families. Children who were assigned to control groups in these studies were often deprived of adequate nutrition and other resources, as in one of the nutrition studies designed to test the efficacy of newly developed vitamins in the 1940s. When disease spread through the schools, medical treatment was deliberately withheld for some children—again, so that data could be collected for ongoing studies on medications and vaccines. Scientists and physicians who visited these Indigenous communities responded to the prevalence of malnutrition and starvation they found there *not* with calls for relief in the form of much-needed food supplies, but instead to preserve and prolong the sets of conditions that produced malnourished populations for the purposes of nutrition studies testing the efficacy of various vitamin and mineral supplements (Mosby). They also tested newly developed products such as vitamin-enriched flour and baby cereal. The cereal “Pablum” was developed by a scientist involved in these studies, which was then used to feed wealthy white children in the south of Canada. This particular form of exploitation is one instance in an overwhelming history of abuse and neglect. The Final Report of the Truth and Reconciliation Commission of Canada characterizes the harm that the Residential School system has done to the health of survivors and their families as follows:

> The health of generations of Aboriginal children was undermined by inadequate diets, poor sanitation, overcrowded conditions, and a failure to address the tuberculosis crisis that was ravaging the country’s Aboriginal community. There should be little wonder that the Aboriginal health status remains far below that of the general population [of Canada]. The over-incarceration and over-victimization of Aboriginal people also have links to a system that subjected Aboriginal children to punitive discipline and exposed them to physical and sexual abuse. (136)

The Residential Schools also cooperated with Eugenic boards—in Alberta and British Columbia specifically—once sterilization legislation was passed, and many children living in the schools underwent involuntary sterilization in their teenage years. In the first half of the twentieth century, the Canadian government also set up multiple internment and forced labour camps. During World War I, Ukrainians and Austro-Hungarians were interned in forced labour camps, and during World War II, the Canadian government interned German-Canadians, Italian-Canadians, and Japanese-Canadians, as well as Jewish refugees arriving from Europe.

The 1907 race riot in Vancouver expressed the growing anti-Asian racism of the period, in which businesses and homes in Vancouver's Chinatown and Japantown were damaged or destroyed, and Asian-Canadian people were routinely attacked and beaten on the streets of Vancouver in this period. Between 1885 and 1923, the Canadian government charged all Chinese immigrants arriving in Canada a fee for the right to immigrate, called a "head tax," to discourage Chinese immigration. Then in 1923, the government completely cut off Chinese immigration until 1947. In the 1880s, 15,000 Chinese guest workers had been brought to British Columbia from China to help build the Canadian Pacific railway, which would run from Vancouver all the way to the Atlantic ocean in Halifax. These workers were housed in abysmal conditions and were only paid less than half of what their Canadian colleagues were paid for their labour. Many of these workers wanted to stay in Canada after the railroad construction was complete, which produced so much anxiety for eugenicists and policy-makers that the "head tax" law was passed to limit immigration.

Offering a scientific program through which the government could engineer the particular ethnically-homogenous society it desired at the time, MacMurchy's manuals and government reports played in to these racist discourses, though in the form of a program supposedly design to 'optimize' health and limit the spread of disease.[56] In her 1911 *Special Report on Infant Mortality*, Helen MacMurchy writes: "What we want is the ordinary Canadian baby. We have the fathers and the mothers and we must see that they can get good milk, good air, and good water" (MacMurchy 5). It is certain that "ordinary" is a euphemism for "white"[57] in this context, based on

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[56] It is precisely this type of violence that continues along racial lines that contemporary scholars of the "post-racial society" discuss.

[57] While instances of Barthes' ex-nomination of whiteness run through MacMurchy's writings, this particular invocation of whiteness without it being named as such can be theorized as an instance of what Ross Chambers calls "the unexamined." While

what is known of MacMurchy's politics and strident belief in eugenic thought. What comes across most clearly here, though, is that "ordinary" refers to a particular standard of health and hygiene that is fully elaborated by MacMurchy in the subsequent pages of her report. MacMurchy writes: "The hygienic surroundings have a most important effect on the nutrition of the feeble infant. If the environment is faulty, the best care and feeding will usually prove ineffectual" (MacMurchy 5). MacMurchy describes the proper environment as one that provides "plenty of fresh air, good general hygiene and individual care" (MacMurchy 5). Environment thus refers to both the physical environment (air quality, etc.) as well as the social environment, and the quality and quantity of care available. The type of environment described by MacMurchy here, then, was not accessible to many beyond the wealthy. This description of the conditions that are most likely to result in health are utterly class-specific. MacMurchy herself explicitly states that a mother who returns to work while her baby is young leaves her baby susceptible to early death—and the option of not returning to work was of course only available to a few.

In the document below, "The Baby's Time-Table," MacMurchy only addresses the needs of the baby, without so much as naming the care-provider who will ensure that the baby follows such a rigid schedule. For MacMurchy, the proper provider of care is the baby's mother, and, as previously mentioned, MacMurchy insisted that the cost of the baby receiving care from someone other than the mother could be as dire as the baby's death. By failing to integrate this prescribed schedule for the baby with a reasonable schedule for the mother to follow—importantly, one

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instances of deviance from the norm of whiteness are marked as such, the promotion of the reproduction of this norm does not need to be named. As Chambers argues, whiteness is "perhaps the primary unmarked and so unexamined…category. Like other unmarked categories, it has a touchstone quality of the normal, against which the members of marked categories are measured and…found deviant" (189).

that takes into consideration the mother's other responsibilities and obligations that might interfere with the baby's schedule as prescribed—MacMurchy reinforces the tenet of maternal feminism that frames the mother as caring and generous above all else. The document does not acknowledge that the mother has already been prescribed a number of other time-consuming practices through which to ensure her family's health, including cleaning, cooking, and taking care of the children and the husband. Following the logic informing the invention of 'factory time' and schedules designed to maximize production (and not to optimize workers' health), the home, too, becomes a factory space for women's own labour in nation-building, and the mother is rendered as a producer of healthy "infant soldiers" to populate the developing nation.[58] Such timetables prioritize elements that will allow for maximal production above all else, and that such schedules have attained the status of common sense over time has resulted in the complete effacement of human biological and psychological needs and desires that would design these schedules differently. While MacMurchy's timetable for new mothers is framed as a *resource* for women through which they might improve their children's health, the timetable works together with other prescribed 'hygienic' behaviours to constitute a form of domination through which eugenic ideas are naturalized and all other behaviour and other cultural approaches to mothering are pathologized.

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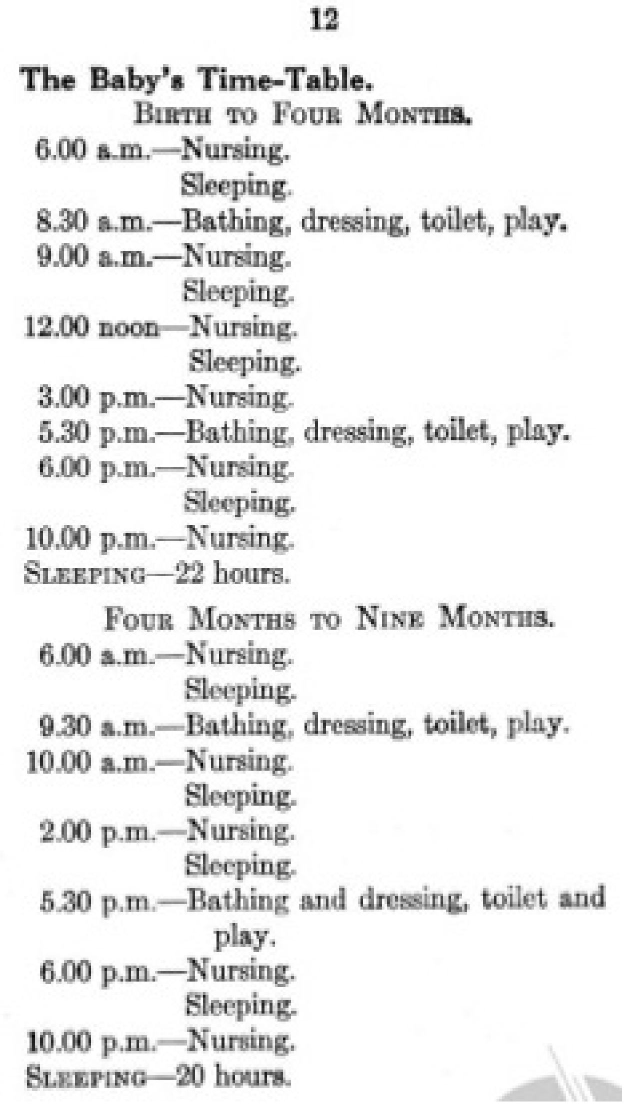
[58] I thank Heather Zwicker for helping me think through the ways in which prescribed forms of women's reproductive labour are informed by the invention of factory time.



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The Baby's Time-Table.

Birth to Four Months.

6.00 a.m.—Nursing.
Sleeping.
8.30 a.m.—Bathing, dressing, toilet, play.
9.00 a.m.—Nursing.
Sleeping.
12.00 noon—Nursing.
Sleeping.
3.00 p.m.—Nursing.
5.30 p.m.—Bathing, dressing, toilet, play.
6.00 p.m.—Nursing.
Sleeping.
10.00 p.m.—Nursing.
Sleeping—22 hours.

Four Months to Nine Months.

6.00 a.m.—Nursing.
Sleeping.
9.30 a.m.—Bathing, dressing, toilet, play.
10.00 a.m.—Nursing.
Sleeping.
2.00 p.m.—Nursing.
Sleeping.
5.30 p.m.—Bathing and dressing, toilet and play.
6.00 p.m.—Nursing.
Sleeping.
10.00 p.m.—Nursing.
Sleeping—20 hours.

Figure 2. From MacMurchy's *How to Take Care of the Baby*; MacMurchy's ideal mother is completely occupied by caring for the children.

In each of her advice manuals, MacMurchy reiterates the importance of women's total dedication to their children. According to MacMurchy, anything less than total dedication to the children will result in disease or death. MacMurchy puts forth a case study of what she calls the "model mother", whose hygienic and maternal practices should be taken up by all Canadian women. For MacMurchy, this "model" mother is the Jewish mother. By reifying the racial, gendered trope of the Jewish mother, MacMurchy is invoking a sense of hereditary doom designed to strike fear in the heart of every woman. In foregrounding the "miraculousness" of the survival of Jewish people despite continual attempted exterminations, MacMurchy points to the space of agency through which she wants to emphasize that through selfless work, women can overcome abhorrent living conditions and provide a set of conditions in which children can develop further and farther than their forbears. For MacMurchy, no obstacle is too great to be overcome through careful practices, perseverance, and hard work. MacMurchy quotes E. W. Hope, medical health officer in Liverpool, who wrote of Jewish homes, even those afflicted by poverty, that

> in every instance, the children are well looked after, all suitably clad, and not one ragged or barefooted child seen. Domestic dirtiness is uncommon, but even where it existed all the mothers seemed to realize their duty and act upon it. The beds were clean… Thriftiness and sobriety were universal… A noticeable feature which always impresses the visitor is the attention given by the mothers to the children's food. In no single instance was the midday meal wanting; moreover, it is usually good and wholesome and prepared in a way which the children relish. It must be remembered that some of these families were in receipt of relief from the Jewish Board of Guardians (E. W. Hope qtd. in MacMurchy, "Report on Infant Mortality" 10).

MacMurchy goes even farther, arguing that poverty can be no excuse for poor domestic and hygienic practices, and prescribing self-sacrifice on the part of the mother. MacMurchy writes: "The miraculous survival of the Hebrew race, ages after the very names of their oppressors have perished from the earth, is manifestly largely due to their proverbial attention to, and success in, their parental duties… in the depths of grinding poverty, not only submerged but struggling for existence at the bottom of such a pit as is digged for their feet by the lowest conditions of life in a great city, still are the Jewish parents true to the traditions of their race, and still does the Jewish mother save her children" (MacMurchy 10). I want to note the terrible irony of a Canadian eugenicist praising Jewish parenting as a model at the beginning of the twentieth century, as Nazi eugenicists would, just three decades later, characterize Jewish culture (conceptualized as a "racial" trait) as the opposite sort of model—one of "primitivism" and "degeneracy" (Levy 167).

The radical discrepancy between these two characterizations of Jewish culture—first, as a model of selflessness, and then as the epitome of primitivism—points to the logical flexibility and imprecision of cultural heredity as analytic, thus partially explaining its appeal for eugenicists. The proliferation of scientific uncertainty around causation—as well as generalized fear, anxiety, and high rates of poverty and disease—produced a conceptual space within which racist formulations of cultural inheritance could gain conceptual ground and influence in the absence of evidence disproving these theses. It was within this same conceptual space of uncertainty that eugenicists articulated ambivalent attitudes towards women. In the case of MacMurchy, her public health interventions were framed as self-help programs through which women could improve their own living conditions—and, especially, those of their children—but the prescribed mechanisms of self-improvement functioned as forms of domination that limited women's ability to pursue their own interests and to take up careers beyond the domestic sphere.

While many eugenicists were feminists themselves, feminism was feared as well as explicitly targeted by eugenic policies as a possible cause of population "degeneration" (McLaren 32). MacMurchy and other eugenicists worried that women's desire to work outside of the home would endanger children and produce less “fit” populations. MacMurchy put it very bluntly: “when the mother works, the baby dies” (*Infant Mortality: Third Special Report* 1912, 16-17). However, MacMurchy’s stance towards women remains contradictory throughout her written texts. While MacMurchy emphasizes the need for government support for mothers and offers rare government recognition of the toll that domestic and maternal labour takes on women, she also blames mothers for the illnesses and deaths of their children (Comacchio 78-83). She insists that education must be accessible to all Canadian women, but then she promotes a narrow pedagogical focus for women, essentially guaranteeing the restriction of women’s work to the domestic realm. The latter reflects a primary tenet of eugenic thought. Recognizing the biopolitical power women attain in their roles as homemakers—thus having complete control of the developmental environment in which the “infant soldiers” and future of the nation are shaped—MacMurchy states that girls’ education must provide “an opportunity of learning the right way of conducting the household” (MacMurchy 22). The importance of the proper training of women so that their domestic practices will serve state interests is emphasized throughout MacMurchy’s report.

There was a great deal of scientific uncertainty during this period concerning race and hygiene as agents of health and disease. Public health physicians struggled to determine the locus of causation in racialized communities afflicted by unusually high rates of disease: was the higher rate of disease caused by a “racial susceptibility,” or by a set of hygienic practices that renders the community more at risk? In the colonial context, as Ittmann argues, hierarchies between groups were naturalized as racial and biological, and the stakes of maintaining this narrative were high. The maintenance of colonial power relations is in many ways dependent upon cementing the belief that “distinctive racial groups…occupied specific positions in the imperial system due to their innate abilities or cultural practices [that were understood as race-specific]" (Ittmann 75). Colonialism was predicated upon this assumption that hierarchies of class and race exist apart from particular environmental conditions, though those conditions, including poverty and malnutrition, were understood to exacerbate existing forms of inequality. Still, an important part of colonial scientists' role was to produce evidence of the so-called "eternal" nature of hierarchies of class and race in a number of different contexts. As Ian Mosby has discussed, medical research in the form of nutrition experiments carried out on Indigenous children living in Indian Residential Schools in Canada were designed to answer this same set of questions. Typical of colonial science, though, these experiments did not consider the possibility that what appeared as "ethnic" or "race-specific" diseases and susceptibilities were not at all "eternal" but instead caused by the deprivation, malnutrition, and poor living conditions created by colonialism itself.[59]

At the same time as colonial governments had a vested interest in framing colonial subjects as biologically inferior in order to justify their rule and the forms of inequality it engendered, colonial governments also needed to maintain the health of their subjects to make use of their labour power, if not for more humanitarian reasons. Colonial demographers studied the behaviours of the colonized with an eye toward so-called "pathological" behaviours that may result in either overpopulation, or the

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[59] As the Final Report of the Truth and Reconciliation Commission of Canada notes, "[r]esidential schooling was only a part of the colonization of Aboriginal people. The policy of colonization suppressed Aboriginal culture and languages, disrupted Aboriginal government, destroyed Aboriginal economies, and confined Aboriginal people to marginal and often unproductive land. When that policy resulted in hunger, disease, and poverty, the federal government failed to meet its obligations to Aboriginal people. That policy was dedicated to eliminating Aboriginal peoples as distinct political and cultural entities and must be described for what it was: a policy of cultural genocide" (137). Crucially, the Report also documents Indigenous resistance as it notes that "[d]espite being subjected to aggressive assimilation policies for nearly 200 years, Aboriginal people have maintained their identity and their communities. They continue to assert their rights to self-governance" (137).

production of susceptible populations (Widmer). This colonial project of diagnosing particular behaviours as pathological is taken up by Canadian eugenicists as a primary tactic. It is through these eugenic calculations of biovalue—bringing together measurements of racial typologies, class typologies, and estimations of economic productivity—in a form of public health speculation that these colonial practices come into full view. Public health—including its scientific and pedagogical components—can function as a core mechanism of colonial domination, though a more insidious one than the more coercive mechanisms that we more commonly associate with colonialism. To proclaim a particular mechanism of causation as true or scientifically accurate is to control the way in which a society understands the flow of power. More directly, to proclaim a cause as true is to seize power. Uncertainty concerning causation, by contrast, results in dependence and vulnerability.

MacMurchy explicitly indicts poverty as the primary cause of infant mortality in Canada, and of ill health more generally, bolstering her argument by citing studies measuring correlations between poverty and disease in Baltimore and New York. In her description of the mechanisms through which those living in poverty are afflicted with disease, MacMurchy is clear and precise in her focus on how a lack of resources creates deficiencies that render those living in poverty more susceptible to illness and early death. She considers ways in which the state might work to redistribute resources and even out inequalities, but doesn't go far in this regard as she sees the state's role in redistribution as a minimal one. The state cannot ensure that "the poor baby" receives the same resources as "the rich baby," as the state cannot afford to provide "certified milk" to all who cannot afford it (MacMurchy 5). The state should, as the epigraph highlights, "see that the poor man's milk is good enough to keep his baby alive" (5). This rationale of benign neglect very closely resembles that which informs current welfare policies in Canada: the provision of just enough to keep those living in poverty alive, and nothing more.

Figure 3. A photograph published in MacMurchy's *Report on Infant Mortality*, likely included to give privileged Canadian government policymakers a visual sense of the sort of living conditions that result in elevated rates of disease (and to support MacMurchy's argument for increased government spending on sanitation infrastructure).

MacMurchy's report attempts to justify the costs to the government of improving infrastructure and living conditions for those living in poverty, arguing that if the government chooses to invest in such measures now, the investment will "pay off" later through fewer required expenditures to treat illnesses, and more productive citizens whose labour would contribute to the national economy. Under the heading "Expensive, but Economical," MacMurchy writes: "Sanitary authorities in compactly populated districts [again, a euphemism for people living in poverty] should decide to remove all dry closets if a water-carriage system is practicable, to introduce and maintain efficient scavenging, and to provide for the satisfactory paving of streets and yards when required. Doubtless these measures will be expensive; but they are much more economical than the sickness and impaired efficiency of the population which are their alternative" (MacMurchy 22). The logic MacMurchy introduces here—that public health and infrastructural interventions may seem prohibitively expensive in the short term, but that such measures will allow for reduced spending in the long term—is invoked again by the discourses of prevention that have emerged alongside the promotion of personalized medicine. In both MacMurchy's context and the present day context, discourses of prevention are profoundly ambivalent in that they point to the implementation of specific measures that improve living conditions and access to health, rendering them more equitable, but do so on their own terms, rather than in a way that would most benefit those in need. It is the mechanism through which the terms and values of those in power—in MacMurchy's case, eugenic thought—are made to seem natural and inevitable through the invocation of scientific evidence that works to stubbornly obscure the thinking that would lead to resistance to such domination.

One tap on the corner is the sole water supply for this row of houses, and for another row at right angles to it. —Burnett.
This tap is also the water supply for another house nearly quarter-mile away. East end of Toronto.

Figure 4. A photograph published in MacMurchy's *Report on Infant Mortality* illustrating a causal link between unhygienic living conditions, inadequate infrastructure, poverty, and rates of disease in Toronto.

One of the solutions MacMurchy envisioned as a way to reduce the proliferation of disease through unhygienic habits was a pedagogical one. She proposed the development of mixed-class housing structures in cities so that working class mothers would learn from the hygienic habits of middle and upper class mothers. She wrote "in all of our towns there is now less opportunity than ever for the classes to mix with one another… So many of the towns had a west end and so many had an east end, to which very few of the west-end people ever went. It was highly important that the west end should mix with the east end…" (MacMurchy 4). This is one of the clearest articulations of MacMurchy's belief in the power and primacy of cultural heredity: the determinant capacities of learned habits and practices overdetermining that of social class. This concern preoccupies MacMurchy, as expressed in her observations of families living in poverty: "the children were damaged in a way that could not be ascribed to the poverty of the mothers" (MacMurchy 4).

I draw attention to MacMurchy's demarcation of the behaviours that constitute the "ordinary Canadian" from those seen as betraying a lack of fitness because behind this hierarchy of behaviours lay a more insidious racial hierarchy. As Carolyn Strange and Jennifer Stephen write, though the Eugenics board claimed this was unintentional, Indigenous people in Canada "were assigned for sterilization at disproportionately high rates: 75% of Aboriginal people presented before Alberta's eugenics board were sterilized, compared to 47% of presentees of European descent" (534). Sterilization was promoted at the time by MacMurchy and other Canadian eugenicists as a measure through which to prevent "unfavourable" traits from being inherited by subsequent generations; in this context it is particularly clear that this measure was legislated with an interest in maintaining colonial power relations, within which a notion of Indigenous peoples' "biological inferiority" was politically crucial. As Strange and Stephen note: “Eugenics administrators who linked ‘Indian blood’ to low intelligence were predisposed to diagnose Indigenous people as ‘mentally defective’ and incompetent: consequently they were judged unfit to make their own reproductive decisions” (534). Strange and Stephen emphasize the way in which workers at various state institutions in the interwar years were trained to be ‘on the lookout’ for individuals considered unfit for reproduction. Among those assigned to this role of community watch in which they were asked to identify those who should be deemed ‘unfit’ were “teachers, nurses, social workers, doctors, psychologists, and juvenile court judges” (534).

These surveilled individuals later deemed ‘unfit’ were disproportionately living in poverty and of Indigenous ancestry. So, “Canada’s sterilization laws, while never explicitly race-specific in design or intent, were implemented to racist effect” (534). I argue that it is such state programs which are *not* explicitly race-specific in design, or at least not avowedly so, that are sometimes most dangerous, including those informed by the ideology of “colorblind” neoliberal humanism. For this reason, I try to draw attention to iterations of cultural heredity as articulated in various institutional settings and the way they are used as justification for racist practices.

There are multiple forms of eugenics ongoing in North America today—from prenatal testing, selective abortion, forms of genetic counselling, and less recognizable forms such as tax incentives designed to encourage the wealthy to reproduce at a higher rate. These practices—like the ones advocated by MacMurchy—are not explicitly racist, but instead framed as “economic” measures with uneven effects for different groups. The next chapter, however, discusses an instance in which technoliberal ideology explicitly medicalizes racial inequality, thus displacing this problem from its social context. In Chapter Two, science is dissociated from the social not through the MacMurchian technique of invoking pathological deficiencies and prescribing hygiene as treatment, but through the FDA's approval of a pharmaceutical product whose circulation reifies the notion of race as biological.

Chapter Two: "Race-Targeted Medicine, Genomic Science, and Heredity as Causation"

> The income gap between black and white households is roughly the same today as it was in 1970. Patrick Sharkey, a sociologist at New York University, studied children born from 1955 through 1970 and found that 4 percent of whites and 62 percent of blacks across America had been raised in poor neighborhoods. A generation later, the same study showed virtually nothing had changed.[60]
>
> An unsegregated America might see poverty, and all its effects, spread across the country with no particular bias toward skin color. Instead, the concentration of poverty has been paired with a concentration of melanin.[61]
>
> The best humans have not been produced yet. [We have not yet produced] the smartest humans, or the longest-lived humans. The more we know about coding, the more we can optimize and move toward the direction we want to move in. We will have much finer control over the types of people that are born in the future through this."[62]

At the end of the twentieth century, with funding for research in genetics eclipsing that earmarked for public health, fuelled by the now widely-held conviction that the mechanism of heredity is primarily genetic, North American governments increased their investment in scientific remedies for social ills. In a development that Helen MacMurchy would not have anticipated, the developing "tailored medicine" industry in the US ideologically cemented the idea that pathology is biological (rather than cultural), and, further, that it is racial, with the production and FDA approval of the drug BiDil. This chapter examines the conditions of possibility that produced this event through a consideration of the epistemic shift that takes place at the nexus of

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[60] Ta-Nehisi Coates, "The Case for Reparations." *The Atlantic.*
[61] Ta-Nehisi Coates, "The Case for Reparations." *The Atlantic.*
[62] Steve Hsu, theoretical physicist at the University of Oregon, discussing his work with the Beijing Genomics Institute's Cognitive Genomics lab in its quest to identify a genetic basis for human intelligence (interview in the documentary *DNA Dreams*).

racial politics[63], state calculations of biovalue, and scientific debates over the locus and mechanisms of heredity, variation, and causation.

The focus of scientific research on mechanisms in the causation of human disease shifted significantly after MacMurchy's era, the interwar heyday of eugenics, and, most consequentially, with the end of the Second World War. The fact that biological concepts of race figured so centrally in the Holocaust, and that Nazi medical experimentation on and murders of between six and eleven million people were carried out *in the name of science*, called for extensive debate concerning how biological research could be rehabilitated following the horrible perversion effected by Nazi science. In 1945, new international coalitions were developed in the name of "never again," with the mandate to prevent future genocides; these organizations include the United Nations and the United Nations Educational, Scientific, and Cultural Organization (UNESCO).[64] As Jenny Reardon argues, following Hannah Arendt, this was the moment of the emergence of universal humanism, as "discourses of sameness" replaced Nazi-era "discourses of difference," including race and nationhood (Reardon 13). Universal humanism, it was posited, would abolish the conditions of possibility for genocide that might be spurred on by academic and popular support for scientifically endorsed ideas of racial superiority and inferiority (Reardon 13).

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[63] In this consideration of the racial politics in the US context, the ongoing legacies of slavery are the primary focus. Of course, as I discussed in Chapter One and will address again in Chapter Three, Canada perpetuates its own version of state-sanctioned systemic racism, including the neocolonial treatment of Indigenous peoples.

[64] This post-war initiative to build a strong foundation of international humanism also resulted in the publication of declarations such as the Universal Declaration of Human Rights in 1949.

Just as German universities underwent a process of "de-Nazification" at the end of the Second World War, so did science.[65] After the Nazi era, there was no place for the study of race in science.[66] The scientific study of race was politically unjustifiable in a climate that aimed to reinvent and un-taint science for a new era working towards the prevention of genocide (Hazard). To firmly entrench this reform measure in the collective consciousness, in 1952 UNESCO published a book written for children entitled *What is Race?* (Bangham). Jenny Bangham argues that this children's book works to abolish scientific concepts of race associated with Nazism and considered still dangerous[67] with a new genetic concept of "ethnicity" and "genetic variation." Despite moving beyond Nazi ideas of racial hygiene, science would still have to address the existence of variation between groups in a biological idiom; genetic science presented a mode through which the UN could redeem science as "universal, explanatory, and politically neutral" (1). Genetics was rendered a form

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[65] While race thinking in science was immediately disavowed in Germany at the end of the Second World War, resulting in a large-scale overhaul of concepts and vocabulary through which ideas of race were articulated, race thinking in North American science persisted after the end of the war (Hazard). Mid-century articulations of race thinking appeared in various forms in North American science, mostly driven underground and rendered as what Raymond Williams would call residual forms, though some strains of race thinking remained dominant in the context of ongoing eugenics movements in the US (Stern).

[66] As Bangham argues, following the Second World War, genetics was ideologically reinvented as a "neutral, universal" form of knowledge designed to act as "a social remedy and a diplomatic tool…that would allow people in diverse parts of the world to understand one another" (2). The aim of putting forth this concept of genetics as *the new science* was to render the science of the Nazis unrecognizable as a form of science.

[67] In Germany, the term *Rasse* (race) is still considered dangerous and is rarely used, except with reference to breeds of horses and dogs. This difference in the politics of language around race (especially in contrast with the politics of race in North America) can be partially explained by a lingering fear of the concept of race being even remotely associated with biology. Instead of "race," the term "migrations-background" is used in Germany, bringing geography to the forefront in place of biology. Curiously, though, the term "human variation" is still understood as politically neutral in the German context, while this term in fact references the history of physical anthropology that contributed to Nazi practices of "racial hygiene."

of "scientific humanism" (Bangham 2) that would provide "an enlightened and non-prejudicial" understanding of human difference (Bangham 3). Crucially, genetics was figured as a science that would unite rather than divide. The scientific, social, and political promise of genetics was articulated through its stated potential to *transcend* Western culture's fixation on race. Genetics, it was argued, would produce scientific evidence of humans' fundamental sameness, relegating superficial ideas concerning racial difference to the scientific and cultural sidelines. As Bangham writes, the science of genetics "promised access to apparently deeper commonalities that tied together all of the peoples of the world" (3).

Pre-HGP Narrative

Between 1945 and 1990, population geneticists and physical anthropologists worked to unlock the secrets of what was conceptualized as "human genetic diversity," while most were careful to underline biological sameness between groups over and above explorations of what constitutes diversity (Reardon 11).[68] Increasing interest in the precise mechanisms that control and constitute human variation was central to the development of the Human Genome Project (HGP), a greatly-hyped and abundantly funded study that was expected to revolutionize scientists' understanding of the role of genetic material in human disease, as well as providing answers to lingering questions surrounding ethnicity and the biological differences between groups. The HGP began in 1990, supported by three billion US dollars streamed through the United States National Institutes of Health and Department of Energy (Reardon 11). Though genomic scientists were keenly interested in that which

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[68] During this period, anthropologists supported scientists in this desire to move "past" race though publications such as Frank Livingstone's "On the Non-Existence of Human Races" (1962).

differentiates *types* of humans, as Reardon emphasizes, "[o]ne of the main assumptions underlying [the HGP]…was that all human genomes were enough alike to create such a record" (Reardon 11). And the research method through which genomic data was produced by the HGP—genome sequencing performed primarily by machines, and not by humans—contributed to the genomics' image as a "neutral and objective" form of knowledge production. Reardon and Stevens argue that as the logic of machine thinking becomes dominant in biology and bioinformatics, wherein knowledge is produced primarily through computers, even knowledge about race is cast in a different light—as somehow "non-ideological" and "non-political," stemming from a perceived lack of human agency in the production of data (as though the computers and sequencing machines have programmed themselves!).

Post-HGP Narrative

On June 26, 2000, then US President Bill Clinton gave a speech together with then UK Prime Minster Tony Blair celebrating the completion of what was known as the "first draft" of the Human Genome Project. Clinton and Blair considered the political implications of the data produced by the HGP thus far, with Clinton lauding the knowledge output of the HGP as "the most important, most wondrous map ever produced by humankind" (1). The mood of the press conference was one of enormous enthusiasm and almost unprecedented optimism concerning the medical futures of humanity, and their political and social future, too.

One of Clinton's most jubilant pronouncements excitedly reported the genome scientists' findings concerning race and ethnicity. While genome scientists had expected to uncover more evidence of biological differences between groups, the HGP produced the opposite result: according to genomic data, the tiny differences between “racial” or “ethnic” groups are utterly dwarfed by the commonalities they share. As Clinton proclaimed, “one of the great truths to emerge from this triumphant expedition inside the human genome is that in genetic terms, all human beings, regardless of race, are more than 99.9 percent the same. …The most important fact of life on this Earth is our common humanity. My greatest wish for this day for the ages is that this incandescent truth will always guide our actions as we continue to march forth in this, the greatest age of discovery ever known” (3).

At this stage in the HGP, scientists were still optimistic that the project would yield highly “actionable” knowledge that would translate into pharmaceutical applications and novel medical treatments once the HGP was complete (Reardon 46). Clinton praises this anticipated set of medical developments, inaugurating in earnest an era that would begin to understand the causation of disease as increasingly—and even solely—genetic. Aiming to popularize the scientific findings for consumption by the American public, Clinton described the genomic data as “profound new knowledge” through which “humankind is on the verge of gaining immense, new power to heal” (2). He promised that genome science “will revolutionize the diagnosis, prevention and treatment of most, if not all, human diseases,” including “Alzheimer’s, Parkinson’s, diabetes and cancer by attacking their genetic roots” (Clinton 2). Clinton explicitly points to the role of the biotechnology industry in “translating” this genomic data into marketable products that can deliver this knowledge to sick bodies.

Clinton’s optimism is earnest; it was still widely hoped at this time that genome science could provide such miraculous “cures” for disease. It was in 2000 that the rhetoric of “personalized medicine” emerged through the promise of “attacking genetic roots” through tailored treatments. Clinton promised Americans that "sophisticated new drugs" would "precisely target the faulty genes and cancer cells, with little or no risk to healthy cells" (2). Putting forth the "cure for cancer" carrot as bait for investors, and to give hope to Americans, many of whom in 2000 lacked basic health insurance, Clinton spoke of the prospect of a cure for cancer with assuredness: "it is now conceivable that our children's children will know the term cancer only as a constellation of stars" (2). Fifteen years later, genome science is no closer to curing cancer, and yet, a cure for cancer is, in 2015, still promised "within our lifetime" by proponents of personalized medicine (Princess Margaret Hospital 2015).[69]

At the time of the HGP's official completion in 2003, the rhetorical establishment of the concept of the "post-racial society" was well underway in the United States. While the political repercussions of declaring a "post-racial" social order are vastly different in the United States than in European contexts like Germany, one of the material results is the same. "Post-racial" ideology triggers a conceptual undoing of forms of evidence that allow for reparative measures such as affirmative action policies, and open up space for victim blaming in contexts where systemic racism still determines the flow of resources. I argue that the scientific results of the HGP must be interpreted in light of this rhetorical and cultural context of the "post-racial society." The completion of the HGP and repeated pronouncements that there is "no biological basis for race," were not entirely innocently corralled into the discourse of "universal humanism" through which the HGP was initially conceptualized in 1990. In his official comment on the completion of the HGP in 2003, US President George W. Bush "called for global unification and

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[69] Interestingly, epigenetic scientists refrain from gesturing towards a cure for cancer. I argue that those who study environmental interactions are more cognizant of how misleading such a promise can be, and how it can distract from potentially productive sites of medical intervention.

a ‘new world order’” (Reardon 45) in which biological ideas about race would no longer have any validity. While Reardon reads Bush’s statement as a response to global desires for reunification following the end of the Cold War and a global “market for humanitarianism” (Reardon 45), it is pertinent to examine the rhetorical abolition of biological race in relation to US post-racialism and Canadian official multiculturalism.

Post-HGP Crisis

Though race emerged following the completion of the HGP study as much less scientifically significant than expected, with only a tiny margin of difference identified in genomic data between racial groups, it still did emerge as a quantifiable (“targetable,” “personalizable,” and “actionable”) category. This was exactly what investors who provided the financing for the HGP, frantically seeking return on their investments, needed to identify (Reardon, *Postgenomic Condition*). As Koenig, Lee, and Richardson note, these identifiable categories were extremely valuable for potential pharmaceutical applications: “[a]s the pharmaceutical industry seeks marketable technologies to patch over an unexpected post-genomic drought in medical breakthroughs, pharmacogenomics has become a particularly attractive investment” (5).

As Koenig et al. argue, the last decades have seen a strange trajectory from a strict separation between race and biology to (at the outset of the twenty-first century) a sudden and urgently-articulated return to the biological study of race. As they write: “In the pharmaceutical industry, the promise of remedying health disparities has also been used to lend a politically correct image to efforts to market drugs or genetic tests to racial subgroups. The twin emphases on redressing health disparities and individualizing health care shields race and genetics research from appearing fringe or retrogressive as it once might have" (5). It is curious that the pharmacogenomic approach to race encompassed both conceptions of causation: genetic and environmental. A cynical analysis would suggest that this approach was purely strategic on the part of the pharmaceutical industry: the idea that a return to a biological concept of race would only be accepted if the social determinants of health (and increased susceptibilities to certain forms of disease in some racialized communities *because of* living conditions) were at least gestured towards. It is also possible, though, that considerations of social and environmental forms of causation were genuinely beginning to be considered as biologically and medically relevant in this period. One of the reasons these developments are so difficult to assess is that the pharmaceutical industry is without exception driven by a profit motive, so that benevolent gestures (even when backed up by scientific evidence) are difficult to take at face value. However, an excessively deterministic approach to these questions can gloss over detail, and sacrifices attentiveness to exceptions as well as the very real ways that race is sometimes medically relevant.

Social scientists studying race and genetics have been understandably hesitant to make pronouncements about this new development and its complicated politics. The terms of the debate have shifted, and continue to shift in ways that are not easily explained and difficult to predict. For instance, the US National Association for the Advancement of Colored People (NAACP) has supported genetic studies of race and the development of race-targeted medicine. At first glance, this support seems misguided, as these scientific projects would seem to work against the interests of the NAACP. However, while the HGP data points to negligible biological difference between individuals belonging to different racialized groups, this biological knowledge does not structure the dynamics of everyday life. Instead, tragically, systemic forms of racism do (in North America, and in many other parts of the world). In this everyday world, policies such as affirmative action and reparations for past wrongs require a form of proof of racial identification. And, more often than not, biological forms of proof are required. Further, as Dorothy Roberts argues, systemic racism has long excluded racialized people from the benefits of medical research and inclusion in clinical trials, so for this reason, the prospect of inclusion in medical research—and even becoming the privileged *subject* of that research, whose specific medical needs are taken into account at the outset of the study—represents a welcome shift for racialized people.

Paul Gilroy's optimistic vision articulated in *Against Race* (2000), that racial thinking would be scientifically disproven by data gathered as part of the HGP, possibly prompting a conceptual invalidation of racist practices, now registers as utopian, and even naïve. The completion of the HGP instigated movement in the opposite direction: scientists' attention turned to race once again, and this time with an even more frenzied enthusiasm, and the abundant financial support of the pharmaceutical industry. It is into this political climate, and following the intellectual trajectory of race and science described above, that the concept of race-targeted medicine emerges.

The Concept of "Race-Specific" Medicine

> The biological fact of race and the 'myth' of race should be distinguished. For all practical social purposes 'race' is not so much a biological phenomenon as a social myth. The myth of 'race' has created an enormous amount of human and social damage. In recent years it has taken a heavy toll in human lives and caused untold suffering. It still prevents the normal development of millions of human beings and deprives civilization of the effective co-

> operation of productive minds. "The UNESCO Statement by Experts on Race Problems" (12-13)[70]

In June 2005, the US Food and Drug Administration (FDA) announced its approval of the drug BiDil, designed to treat heart disease in patients who self-identify as African-American exclusively. With this decision, "race-specific" medicine was established, as the FDA became the first regulatory body to approve a medication for therapeutic use in a specific racial group.[71] Manufactured by the pharmaceutical corporation NitroMed, BiDil is comprised of two generic drugs, isosorbide dinitrate and hydralazine, which had been commonly prescribed to treat heart failure prior to the creation of BiDil as a "two-in-one" pill (Kahn, "Race" W1). The composition of BiDil is not novel, and thus cannot be conceived of as a medical breakthrough. Further, the scientific conduct that paved the way for the FDA's approval of BiDil for use in African-American populations was particularly suspect: the clinical trials conducted by NitroMed to test the effectiveness of BiDil on patients

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[70] As cited in Ashley Montagu's *Statement on Race: An Extended Discussion in Plain Language by the UNESCO Statement by Experts on Race Problems* (New York: Henry Schuman 1951): 11-18. A longer excerpt from this text is also cited by Priscilla Wald in her chapter "Science and Technology," forthcoming in the Blackwell *Companion to Critical and Cultural Theory* (eds. Imre Szeman, Sarah Blacker, and Justin Sully).

[71] At least three separate terms are used in scholarship on BiDil: "race-specific" medicine, "race-targeted" medicine, and "race-based" medicine. Following Ian Hacking, I use the term "race-targeted" medicine in reference to the pharmaceutically constructed genre of medicine inaugurated by the FDA's approval of BiDil. Hacking contends that the term "race-targeted" is preferable to the competing term "race-based" because the later implies the existence of race as a biological fact, or, as he puts it, following J.S. Mill, that race exists as a "real" or "natural Kind" (Hacking 103). If a drug was designed for a white population to treat a clinical condition of uncertain causation, it would certainly not be framed as "race-based." Hacking helpfully draws attention to the ex-nomination at work in this industry in which white medical pathologies are framed as universal and innocent, while medical pathologies more common in non-white communities are medicalized. Why, for instance, are "white Australians, given their socially induced tendency to overexpose themselves to the sun," not pharmaceutically targeted to reduce the rates of and deaths caused by melanoma in Australia (Hacking 109)?

predisposed to heart disease were accessible only to African-American participants (Kahn, "Ethnic Drugs"). By carrying out the trials in this manner, NitroMed was able to guarantee its desired outcome. Unless the drug proved to be ineffective in treating heart disease—an outcome that was extremely unlikely, considering the longstanding proven effectiveness of isosorbide dinitrate and hydralazine as separate therapies—it was inevitable that the results of the trials would indicate the successful creation of a "race-specific" drug since the only participants in the trial were African-American, and BiDil was known to be effective in treating heart disease in humans generally. Thus, NitroMed was able to produce results "proving" the effectiveness of BiDil in African-American populations. As Jonathan Kahn notes:

> The trial investigators themselves concede that BiDil will work in people regardless of race. Without a comparison population, the investigators cannot even claim that the drug works *differently* in African Americans. The only responsible scientific claim that can be made on the basis of these trials is that BiDil works in *some people who have heart failure*—period (Kahn, "Ethnic Drugs," italics in original).

For the moment, I will bracket the most obvious objection to NitroMed's dubious practices: the accusation of essentialism. Though this is inestimably important, it remains a secondary consideration until I have contended with the social and political implications of the FDA's approval of BiDil. Thus, rather than putting forth questions concerning the criteria employed by NitroMed for inclusion in their constructed category of "African-Americanness" (recognizing the absurdity of any mode of thinking that puts forth a conception of "racial purity"), I periodize the emergence of race-specific medicine and draw attention to the particular discursive constructions through which this practice produces meaning.

The problem of race-specific medicine emerges from within a broader framework of a conjuncture in which biopower produces value through the transformation of biology into information at the molecular level. This particular form of power interpellates individuals as biocitizens or health consumers (Roberts) through discourses of risk and responsibility; biopower possesses the generative capacity to produce new forms of 'common sense' of the truth of the biological, thus ensuring a smooth transition to this new form of biopolitics as the calculated management of the productive capacities of molecular forms of life following the revolution in the life sciences industry.

The contemporary biopolitical moment is one in which the life sciences and capitalism are equally interested in, and working together to forge newly profitable futures for human life through novel conceptions of therapeutic specificity as well as unprecedented forms of corporate management and intervention: race-specific medicine is but one iteration of this tendency. My discussion of BiDil seeks to reframe the disparity in incidence of heart disease—a problem that is too often moralized and technologized—as a social and political problem by focusing on the ways in which science and technology produce material shifts that become intelligible through narratives and social discourses that appear as inevitable discoveries rather than as components of larger political projects. These narratives and discourses often emphasize theoretical and technical complexity, which functions to dissociate science from the social. I draw attention to the way in which BiDil appears as a naturalized, dehistoricized object; as Roland Barthes might say, its contingency is removed so that it is received as a complete, necessary, and rational practice that reflects truth and necessity.[72]

I read the emergence of race-specific medicine as another troubling iteration of a pervasive tendency through which social problems are culturalized, geneticized and technologized; this chapter focuses on the ways in which the institutional authority of science inscribes what is received as a 'true' description of a biological basis for race. In BiDil, we see another incarnation and thingification of MacMurchy's eugenic claim that maintaining the health of a general population cannot follow from equal treatment and equal intervention for all groups. Instead, according to the logic of biovalue, the promotion of improved health for all requires some form of discrimination. This discrimination is usually directed against groups whose capacity for economic productivity is assumed to be lesser—a measurement that in the case of BiDil is encapsulated in and trafficked through the biological concept of genetic variation said to belong to African-Americanness.

The chapter also addresses how this biologization of race gets taken up, informing public policy and the distribution of resources in complicated ways. While heart disease disproportionately afflicts African-Americans, there is no genetic basis for these rates of disease (Winkleby et al.). Instead, these higher rates of heart disease reflect the disproportionate access to material resources for racialized people in the

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[72] Scientific pronouncements about the causation of disease frequently take on the form of myth as described by Barthes in *Mythologies* (Trans. Annette Lavers. New York: The Noonday Press, 1972). As Barthes writes on his concept of naturalization: "myth is experienced as innocent speech…not because its intentions are hidden—if they were hidden, they could not be efficacious—but because they are naturalized. In fact, what allows the reader to consume myth innocently is that he does not see it as a semiological system but as an inductive one" (130). Barthes reveals the "systems of values" that inform and comprise myth, and the ways in which myth can present these values as fact. Science as culture is particularly well equipped in the framing of its signs as "a system of facts," and it is the specific mechanisms of these processes of naturalization that this thesis critically evaluates.

US. Heart disease is a disease of poverty that could most effectively be treated through structural change, but instead, BiDil works to reify race as biology, which serves a number of political imperatives, including the maintenance of systemic racist practices in the US (Roberts). The geneticization of race is symptomatic of a larger tendency in the logic of the personalized medicine industry in the context of neoliberalism. The production of BiDil, then, can be read as another iteration of the narrative within which responsibility for health is framed as belonging to the individual, thus absolving the state—as well as society in general—of responsibility. I argue that BiDil helps to establish the concept of individual risk and responsibility (in the place of state responsibility for health) as the conceptual ground upon which the personalized medicine industry might flourish.

Epistemic Trafficking

Data produced by scientific studies is often presented as banal, and is not usually understood as an illicit object likely to be disseminated through the mode of circulation known as trafficking. However, the particular form of trafficking through which data gets translated into information and information into knowledge—which in turn gets marshalled to do political work—is a process that has not yet received enough critical attention from humanities scholars. This dissertation focuses on the ways in which science produces a particular form of narrative that is employed to explain and shape the political organization of social life. While science is a conceptually hermetic practice that relies almost entirely on metaphor in its construction of transmissible narratives for popular consumption,[73] technological

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[73] Especially the more abstract sciences such as molecular biology, which cannot think itself or function without the use of metaphors. For more on the role of metaphor in scientific practices, see James Bono, "Science, Discourse, and Literature:

products are often put forth as the only possible solutions for problems that are historical, social, and economic in nature. My analysis is attentive to both the micro-production of scientific knowledge in the lab as well as the function of the scientific object as a nexus of truth-power.

BiDil must be understood as the launch of a new racial project born on the terrain of genomics. I explore the practices of ordering and classification that take place within NitroMed's production of a genetically-determined need, drawing attention to a new dominant ideology bolstered by scientific research and statistical measurement: an emergent form of what I call *epistemic trafficking*. The concept of "traffic" is crucial to this analysis because it illuminates the double-movement of race-based medicine: racialized scientific knowledge is disseminated evenly and yet it produces a decisively uneven distribution of material resources. This chapter examines the epistemic trafficking performed by the production of BiDil through a modification of Michael Omi and Howard Winant's concept of the "racial project" as a form of social organization based on an essentialist understanding of race that works to distribute resources "along racial lines" (56).

BiDil should be understood to form part of a larger political paradigm within which social inequalities get displaced onto science as a separate and apolitical sphere. Scientific discourse, in turn, represents these inequalities as naturalized biological categories that are natural and inevitable. I focus on the practice of epistemic trafficking and the way in which its ability to biologize social problems quickly ushers these problems out of what is understood to be the political realm and into a scientific practice that is rendered opaque and illegible as a result of its complexity and the expertise required to critically engage with its claims. I draw

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The Role/Rule of Metaphor in Science," in *Literature and Science: Theory and Practice*. Ed. Stuart Peterfreund. Boston: Northeastern University Press, 1990. 59-89.

attention to the questions that cannot be asked and criticisms that cannot be conceptualized from within this epistemic paradigm in which one particularly short-sighted technological solution is promoted as the correct and necessary panacea to treat a problem that is historical, social, and economic in nature. The dominant ideological (and financial) investment in genetic determinism ensures that particular questions concerning class, systemic racism, and health cannot be asked from within the conceptual space opened up by the approval of BiDil.

While race-based medicine has received criticism from numerous quarters,[74] two key elements are consistently missing in analyses of the problems of race-based medicine. First, the focus of the supposed materiality (at the level of DNA) of racial difference elides social factors contributing to disease, including unequal access to health care, education, housing, and nutrition. Second, and perhaps even more importantly, a lack of close critical attention to the discourse and conditions of scientific production prevents us from recognizing drug research itself as a site in which systemic racist practices and beliefs are articulated. In order to reorient the debate away from a critical analysis of the narratives constructed by genomics as puppet of big pharma—a crucial site of debate, to be sure—I turn instead to the animating logic of the institutions that construct scientific facts prior to their circulation.

Extending the critique put forth by Bruno Latour and Steve Woolgar in *Laboratory Life*, it is important to note that the daily tasks of the laboratory, including

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[74] See, among others: Jonathan Kahn. “How a Drug Becomes ‘Ethnic’: Law, Commerce, and the Production of Racial Categories in Medicine.” *Yale Journal of Policy, Health, and Ethics* (2004); Dorothy Roberts. “Is Race-Based Medicine Good for Us?: African-American Approaches to Race, Biomedicine, and Equality.” *Journal of Law, Medicine & Ethics* (2008); Duana Fullwiley. “The ‘Contemporary Synthesis’: When Politically Inclusive Genomic Science Relies on Biological Notions of Race.” *Isis* (2014).

data collection and analysis, are carried out largely by white[75] Americans, i.e., those who have a stake in, and have benefitted from, the racial hegemony their research supports.[76] The consequences of a disproportionately low number of African-American scientists participating in pharmacological research produce a deficit in the biomedical imaginary that eludes recognition as such because it is trafficked by the authoritative discourse of science. While existing criticisms of race-based medicine contest genomics' ideas concerning what constitutes race, I argue that the emergence of race-based medicine is symptomatic of a meta-epistemic problem. Though it has been widely acknowledged that scientific research is a white practice, the humanities have not yet begun to grapple with the material and ideological consequences of the fact that scientific knowledge is itself racialized.[77]

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[75] The US National Science Foundation conducted a study measuring the racial and ethnic diversity of recipients of doctorates in science, engineering and health from American universities in 2008, and published the following statistics: 78.0% of respondents self-identified as white, 14.8% self-identified as Asian, and 2.8% self-identified as black or African-American (Milan and Hoffer). In a 2014 census of the general US population, 62.2% of respondents self-identified as white, 5.2% self-identified as Asian, and 12.4% self-identified as black or African-American (2014 US Census). According to this data, then, white and Asian communities are overrepresented in American science, engineering, and health, while blackness is underrepresented.

[76] I am not arguing here that white scientists are of necessity committed to a genetics of race. The fact that laboratories across the United States are run by a group of scientists who are disproportionately white speaks to persistent barriers and forms of inequality that prevent a more diverse set of scientists from working in US labs. How would the content of scientific knowledge concerning the intersection of genetics and race shift if the scientists producing this knowledge more faithfully reflected the diversities that comprise the US?

[77] Many scholars, including feminist historians of science, sociologists, and STS scholars have written extensively on the epistemic, social, and political consequences of the male dominance of laboratory science. In her Introduction to *Gender and the Science of Difference: Cultural Politics of Contemporary Science and Medicine*, Jill Fisher offers a nice rejoinder to essentialist critiques of science and medicine. Fisher insists that the production of scientific knowledge does not function as simply as through a process we understand as "bias." That said, though, Fisher maintains that "all science is interested" (5). She reiterates the basic tenet of STS that "it is impossible for individual researchers to cast off completely their personal and cultural values or even their economic or professional motives" (5). And because the number

The concept of “traffic” does not designate the circulation of a single idea or set of meanings within a specific target audience and in service of a specific set of interests; rather, it denotes the circulation of a complicated set of signs producing multiple and internally-contradictory ideological implications. Crucially, the traffickers of these signs cannot predict or control the narratives that these signs will become imbricated in once consumed by their recipients. To traffic a set of ideas that have been encoded in a material object is, in a sense, to relinquish control over the ideas such that their circulation becomes increasingly contingent, accidental, and unpredictable. It becomes impossible to guarantee the interpretive reception of these ideas once they have been trafficked. When a set of ideas are trafficked by the FDA—a regulatory institution understood to make decisions on the basis of scientific data in isolation from political and economic interests—and particularly when these ideas offer ‘official’ pronouncements on the biological validity of a category in the name of which enormous violence has been and continues to be perpetrated, it becomes particularly important to examine the ways in which these ideas get disseminated and understood as sacrosanct. Narratives of scientific fact remain disproportionately influential in the contested epistemic space of North America in the twenty-first century.

The epistemic trafficking that was carried out by the FDA when it approved BiDil for use only by African-Americans effectively reified the concept of race as

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of women working in lab science remains so small, this inequality is reflected in the form and content of scientific knowledge produced. Scientific knowledge, then, reflects the patriarchy that produced the male-dominated labs in the first place. As Fisher writes, “science ends up drawing conclusions that are reflective of society’s broader beliefs;…[s]cience may not be biased per se, but it is influenced by and contributes to patriarchy” (5). See also, among others, Evelyn Fox Keller’s *Reflections on Gender and Science* and *A Feeling for the Organism: The Life and Work of Barbara McClintock*, and Londa Schiebinger’s *Nature’s Body: Gender in the Making of Modern Science* and “Getting More Women into Science: Knowledge Issues.”

biological. This reification—in the sense that race came to be understood as a biological thing or fact rather than standing in for a historically contingent set of social relations—was undergirded by public trust placed in the FDA as a consumer protection agency with a "public health mission" whose scientific assessment procedures are understood to reflect the Truth of the Biological. Unlike scientific pronouncements concerning race and biology that emerge from within corporate science or the pharmaceutical industry, which are assumed to be tainted by the profit motive, the FDA has been understood to possess an objectivity and Truth-telling capacity that its private science counterparts lack.

The material and ideological consequences of this particular form of trafficking are dire, and yet this knowledge has been circulated freely and has been enormously influential. The FDA's approval carried the weight of science behind it, and as a result, this decision is framed as indisputable, and as a reflection of a biological truth supported by data and facts. The decision to approve BiDil for use in racialized populations is encoded as a humanitarian decision made to benefit a population that suffers disproportionately from heart disease, rather than a decision influenced by and intertwined with capitalist imperatives. In this way, the carrying-out of a savvy business plan—constructing a "niche market" to ensure strong sales for a new product entering an already-saturated market of drugs designed to treat heart disease—does not merely produce profit for NitroMed, but also cements systemic racial ideology in America, and it is this epistemic shift that has deleterious political, material, cultural, and social effects for racialized people in the U.S. and beyond. What's worse is that the knowledge trafficked by NitroMed and backed up by the FDA—that there is indeed a biological basis for racial categories—constructed a narrative about racial difference that was not only accepted without much resistance, but actually welcomed by the dominant ideology of systemic racism in the U.S. As history has shown, this narrative is not easily reversed.

The Discursive Construction of Race-Specific Medicine

As Kahn suggests, the approval of BiDil ushered in a new era for Big Pharma: what is known today as pharmacogenomics, or "personalized medicine." Prior to BiDil, pharmaceuticals did not produce drugs for specific populations, but instead focused on the development of drugs that would be prescribed widely to "the general population," even creating the conceptual space for these drugs where markets did not already exist.[78] Though the paradigm that preceded pharmacogenomics understood that a wider target population for the drug would produce a larger profit, the new paradigm responds to rising costs of conducting clinical trials because testing on a single population reduces the number of confounding variables that must be accounted for in the trials. As Kahn notes, the cost of conducting clinical trials with drugs for which pharmaceuticals seek approval for the general population can be prohibitively high, within the range of $700-$900 million per drug, and stretching over a period of up to fifteen years ("Exploiting Race" 741). Producing a drug that is targeted towards a specific population reduces the number of variables that need to be taken into account during the trial stage, thus reducing both the cost of the trials and the amount of time required to bring the drug to market. Though BiDil lacked "general population" approval, it was brought to market quickly and inexpensively, and its approval automatically generated a niche market protected by patent until

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[78] For example, as Ethan Watters demonstrates, the pharmaceutical giant GlaxoSmithKline was able to alter Japanese cultural narratives concerning illness and health and the normal and the pathological in order to construct a market for its anti-depression selective serotonin reuptake inhibitor (SSRI) drug Paxil in that country.

2020 (Kahn, “Exploiting Race”), and thus was instantly profitable as its early profits weren’t subsumed in a $900 million debt incurred by broader trials.

The FDA’s approval of BiDil for use in African-Americans suffering from heart disease trafficked a pernicious idea of race as a clearly demarcated biological category supported by science, and thus ostensibly also a ‘natural’ and ‘inevitable’ category to act as the recipient of tailoring by the personalized medicine industry. This narration of race as a necessary (rather than contingent) category for analysis has particularly deleterious effects when trafficked outside the realm of biological research. Capitalism continually requires new markets in order to expand, and as Donna Haraway notes, capitalism in the US feeds off of what it considers to be natural in order to continue to accumulate wealth (214). BiDil works to naturalize the category of race; a high incidence of heart disease in a racialized population in the US is naturalized as a matter of genetics, thus allowing for the creation of a patent-protected market (Kahn, “Exploiting Race”). Kahn suggests that the FDA’s approval of BiDil had the effect of biologizing race in insidious ways, such that inequalities that persist along racial lines were justified scientifically. While I agree with Kahn, I also want to note that an equally disastrous result could potentially follow from the assertion that there is no biological basis for race, such that existing measures put in place to counteract the material effects of racism might begin to be perceived as unwarranted.

Recent genetics research, including that carried out as part of the HGP, has shown that “humans are overwhelmingly genetically identical; racial ancestry accounts for a very tiny sliver of human genetic diversity; genetic population structure is more variable within than between populations; and human genetic variation is fundamentally clinical rather than discrete” (Koenig, Lee, and Richardson

8). These research results, however, should not be uncritically welcomed as the beginning of the end of oppression perpetrated towards racialized people. The danger of potential interpretations of scientific data that would point to the diminishment of a biological basis for racial categories is that this data would then be rendered available to be taken up as justification for what the neoliberal colourblind ideology imagines as a "post-racial" era. Irrespective of whether or not a greater amount of genetic variation exists within any particular racial category than between racial categories, racialized people throughout the world continue to be oppressed. Of additional concern is that policies implemented to counteract the past and present oppression of racialized people, such as affirmative action policies in the US, could potentially be de-legitimized by scientific findings that suggest that there is no genetic basis for the category of race. In an era and context that continue to value "objective" scientific findings over all other explanations, we need to be attentive not only to the questionable explanatory power[79] of these findings, but also to the ways in which these findings function discursively beyond themselves when re-deployed and re-encoded within a broader political-economic frame.

But how can BiDil be considered the first pharmacogenomic drug if there is no genetic basis for the selection of race as a variable? The trait of "African-Americanness" was selected not due to some common genetic characteristic shared

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[79] Especially in a context in which genetic research is funded and promoted as proper locus of health knowledge to the exclusion and diminishment of funding for research on the social determinants of health. In such a context, data produced by funded scientists—mostly working in genetics research—presents only a partial picture of the causes of health disparities, since these studies often do not address the social determinants of health. Of course, all scientific knowledge is contingent and context-specific; I do not wish to argue for the 'objectivity' or 'comprehensiveness' of social determinants of health research, either. My aim here is to point to the way in which the findings of genetic research are often taken up by the media and by the public as possessing unique truth-telling capacities through providing insight into the internal mechanisms of both identity formation and disease causation that lie beyond the reach of lay observation and interpretation.

by research subjects within this group, but rather because many research subjects who self-identified as African-American responded well to BiDil during the first general population clinical trial for the drug, which was rejected by the FDA in 1996 (Kahn, “Exploiting Race”). The variable of race was selected following this initial rejection by the FDA in a *post hoc* interpretation of research findings—in the sense that the variable of interest was defined after the results had been established—which is a further indication of the contingency of this knowledge. Race was selected from eighteen possible variables measured in the study, including “age, race, cardiovascular history, and clinical conditions (such as left ventricular ejection fraction)” (NitroMed in Kahn, “Exploiting Race” 744). The category of race as employed by this study, then, does not describe a common genetic characteristic or other biological feature that rendered this population more likely to benefit therapeutically from BiDil. Indeed, the developers of BiDil have publicly admitted that they do not understand why BiDil works to prevent heart failure in many research subjects who self-identify as African-American: “the mechanism of action by which it appears to have a beneficial effect on heart failure patients is unknown” (Kahn, “Exploiting Race” 742).

Despite this, the selection of race as a variable in this study has produced social and political implications on a scale that is simply unparalleled by other possible research variables (including age, cardiovascular history, and clinical conditions). The scale of the material and epistemological reverberations of this choice of variable underscores the way that this seemingly apolitical decision is not understood as contingent but rather as deliberate and necessary, as though race was the only possible research variable for the study. The selection of race as variable was trafficked as an assertion that race remains a primary biological marker of difference of relevance to today’s medical breakthroughs, when it instead functioned as a cost-saving measure that has never been proven medically significant. It is imagined that decisions made concerning the design of studies are specifically not contingent—that there are no other possible designs for a study—and that a study is designed for a specific end: to maximize therapeutic benefit for a population, rather than to maximize profit. When race gets chosen (or even defined as) as a biologically and/or medically meaningful trait, this act is understood by the public as one of necessity rather than one of contingency.

Research subjects in the BiDil trial who self-identified as African-American found themselves grouped together as participants in the trial not as a result of a genetic commonality but instead because many of these people received therapeutic benefit from BiDil. In the absence of any data pointing towards a biological basis for this grouping, it is likely that a number of other characteristics apart from “African-Americanness” are also shared by many of the research subjects within this group, including less “medically significant” characteristics, such as clinical conditions and living conditions. Both of the latter characteristics are known determinants of health, but it is also likely that this group of research subjects shares other characteristics that do not function as direct determinants of health. Indeed, while NitroMed has been unable to provide any scientific data supporting its hypothesis of a shared genetic trait that determines heart disease, a number of studies provide data that links heart disease to class. These studies suggest “links between hierarchies of social advantage and health” (Braveman et al. 196); in other words, annual income and access to resources (including education, health care, and nutrition) are inversely proportional to higher rates of incidence of hypertension and heart disease (American Heart Association). This pattern in which the distribution of health reflects the capitalist distribution of wealth is shown to be pervasive in the US. As Paula Braveman, Catherine Cubbin, Susan Egerter, et al. write: “[t]hose with the lowest income and who were least educated were consistently least healthy, but for most indicators, even groups with intermediate income and education levels were less healthy than the wealthiest and most educated” (194).

While no *genetic* correlation has been found between racial difference and incidence of hypertension and heart disease, the dominant ideological (and financial) investment in genetic determinism ensures that particular questions concerning class, systemic racism, and health cannot be asked from within the conceptual space opened up by the approval of BiDil. More specifically, the attempt to biologize race distracts[80] public attention from the crucial question in light of this data: why do a disproportionately large number of people who self-identify as African-American live in social conditions that frequently lead to the development of hypertension and heart disease?

Narration as Scientific Method

As Haraway has persuasively argued, scientific laboratories produce narratives of epistemological and material power (255). More specifically, the field of biology as a practice of ordering and classification produces meaning that is disproportionately influential both socially and politically. Biological research produces knowledge through modes of comparison that begin with the isolation of a single research variable, and for this reason, this practice requires tools for

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[80] This is not a conspiratorial claim that suggests that distraction was the aim of the developments that led to the production of BiDil. Instead, the distraction of attention away from inequalities that lead to health disparities was an unintended consequence of BiDil’s approval and production. Still, it is a consequence that must be recognized and reckoned with.

categorization and comparison. In short, biology names and hierarchizes difference for the purpose of this research, and the name, hierarchical position, and significance, often understood through metaphor, get taken up in the social world untranslated, and as a result, these crude differentiations often have deleterious social and political effects.

Particularly within the contemporary context of the rapidly expanding social impact of a pharmaceutical ideology of "personalized medicine," what seems essential is a rigorous interrogation of the interests served by particular research questions that lead to active research on "race-specific" medicine in the first place. What epistemological barriers are being introduced to limit access to the rationale (and rationality) and practices behind the inestimable power and influence in imagining the landscape of medical research, health, and welfare for Americans? In what ways are scientific research practices themselves and the very structures through which scientific "knowledge" is created relics of a not-so-distant past when scientific research was the profession of the white male alone? If these barriers persist today, and they undoubtedly do, then the "facts" and "data" that emerge as "research outcomes" and their broader social and political implications must be scrutinized with a renewed sense of urgency. Further, these research results should be understood as products of institutions created to ensure the impossibility of weakening or dismantling the tenure of white privilege at a structural level.

Scholars now considered foundational in the establishment of the field of Science and Technology Studies (STS), including C. P. Snow, Thomas Kuhn, Karl Popper, Paul Feyerabend, Bruno Latour and Steve Woolgar, were among the first to question the purported "objectivity" of the "knowledge" and "facts" that had hitherto been uncritically accepted as indisputable results of an infallible "scientific method."

Latour and Woolgar's critical examination of the everyday functioning of scientific research in the laboratory has particularly influenced my own position on the construction of facts and statistics produced to legitimate the marketing of BiDil as the first "race-specific" drug.

In order to write *Laboratory Life: The Construction of Scientific Facts*, Latour and Woolgar undertook an anthropological study of the "culture" of the laboratory and the practices and conditions under which science produces "knowledge" and "facts" from the position of "inside outsiders," or "outsiders" (non-scientists) parachuted into this "foreign" environment as observers. While their study has yielded innumerable insights informing current research in the field, their arguments have been met with a great deal of controversy, to the extent that they have been employed as ammunition in an ongoing debate over the validity of concepts such as objectivity, reason, and progress that culminated in the "Science Wars" of the 1990s. Latour and Woolgar's insight posed the construction of fact and value at the site of the laboratory as not only inextricable from, but also a reflection of, a particular set of interests arising out of a particular social and political context. Through an interrogation of the actual practices of scientists conducting research in a laboratory setting, Latour and Woolgar draw our attention toward the particular ways in which "the daily activities of working scientists lead to the construction of facts" (40).

When *Laboratory Life* was first published in 1979, Latour and Woolgar's scrutiny of what were then perceived as the daily banalities of lab work was received with great suspicion: this study constituted an unprecedented shift as the critical attention that had previously been directed towards those holding positions of power was suddenly directed towards those perceived as laboratory technicians (since the technicians' work had been understood as generative merely of research results and data, mechanically producing information rather than shaping the content of this data). By directing critical attention towards the processes through which scientific "facts" are produced, Latour and Woolgar intend to dispel beliefs concerning the purported infallibility of science and the "truths" it puts forth by contextualizing "scientific activity as just one social arena in which knowledge is constructed" (31). As such, they subject science to the same close scrutiny that is directed towards other social arenas out of which knowledge is produced.

Latour and Woolgar's study remains influential today and offers a valuable lens through which to approach critically the machinery that underlies genomics and big pharma as mechanisms that contribute to the administration of the inequities that are inherent to the fractured social body required by capitalism in order to ensure its own reproduction. One of the most relevant insights offered by Latour and Woolgar to a discussion of BiDil is their characterization of scientific research as a struggle to bring order and reason to an unwieldy collection of observations and data which chronically resist tidy, linear, and intelligible classification according to existing schema. Latour and Woolgar contend that research outcomes and the decisions made by scientists in order to reach specific outcomes must be understood as having arisen out of a practice that takes as its "task" the construction of "an ordered account out of a disordered array of observations" (34); or, in other words, the construction of a linear narrative as part of the practice of epistemic trafficking.

This characteristic defining feature of scientific inquiry—the organization and classification of diverse and divergent data, objects, and experiences—is also a defining feature of the racial project described by Omi and Winant. The definition of the concept of race put forth by Omi and Winant describes with precision the particular way in which race is invoked by NitroMed: "race is a concept which signifies and symbolizes social conflicts and interests by referring to different types of human bodies" (55). NitroMed's creation of BiDil as the world's first "race-specific" drug must be understood as the launch of a new racial project born on the terrain of genomics, the influence of which extends well beyond this particular terrain. While the deployment of racial discourse—that is, the fiction of biological racial difference—for economic gain is not new, the production of medicine and other therapies after the Human Genome Project was billed as a paradigm within which race and biology would grow more and more distant from one another, rather than merging under the moniker of race-specific medicine. Omi and Winant define a racial project as that which "is simultaneously an interpretation, representation, or explanation of racial dynamics, and an effort to reorganize and redistribute resources along racial lines" (56). When the scientific practices described by Latour and Woolgar are employed by a racial project, a particular type of ordering and classification ensues. I now turn to a discussion of how NitroMed both constructs "what race *means* in a particular discursive practice and the ways in which both social structures and everyday experiences are racially *organized*, based upon that meaning" through the development and marketing of BiDil (Omi and Winant 56, italics in original).

As I touched on earlier, Kahn emphasizes the contingency of the production of scientific objects and knowledge (as do many Science Studies scholars), showing that race was selected because it was a pre-existing, ready-to-hand category through which a trial could be conducted in the least expensive manner possible, thereby maximizing profit for NitroMed as a biotech start-up that couldn't afford to finance the costs of bringing the drug to market through the larger trials that had previously been required by the FDA. The important point here is that while systemic racism in the US cannot be excised from this discussion, it is counter-productive to place too much emphasis on a conspiratorial analysis of the selection of race as research variable. This would be counter-productive because a dismissal of this process as racist prevents us from analyzing the form and processes through which scientific knowledge gets constructed, which are more complicated than merely an articulation of racism.

Ideological Investment in the Concept of Genetic Determinism

As the sociologist of science Steven Epstein argues, the genomic sciences employ "racial difference" in a manner that is both inconsistent and paradoxical, oscillating between two extremes: either denying the validity of any purported genetic basis for "racial difference," or strategically invoking "racial difference" as "biological fact" in order to support a pharmaceutical industry that depends upon the construction of new, race-specific markets in order to create profit for shareholders (223). Indeed, "racial difference" is invoked by genomics only strategically; the same science that produces data that entirely discredits the belief that there could be a genetic basis for "racial difference" also frequently reifies race as a non-negotiable biological marker of difference, but only when it is profitable to do so. Further, Epstein demonstrates, in a polemic directed against many authors who suggest that it must be acknowledged that there is at least *some* biological basis for "race-based" medicine through references to diseases such as sickle cell anemia which are commonly understood to afflict African-Americans at a higher prevalence rate than other "racial groups" in the US, that "there is no such thing as a racially specific and exclusive disease" (212). Epstein shows that while a higher prevalence rate for sickle cell anemia is found within populations whose ancestry can be traced back to Africa, if any categorization is made to facilitate more effective treatment for this disease, it must be made on the basis of geographic origin, rather than on race (212). Noting that sickle cell anemia afflicts white populations in Africa with the same prevalence rate as is found in black populations, Epstein insists that if there is a biological basis for any method of differentiation between populations genetically, it will fall along the lines of geographic origin rather than race as phenotype. Of course, the NitroMed trial selected its variable of self-identified African-Americanness precisely because this category of race can be neither genetically nor phenotypically defined.

Echoing Robert Schwartz's charge of racial profiling in genomics, Epstein draws attention to the spurious logic animating "race-based" medicine through an articulation of the highly problematic practice of "the use of group-based probabilities to make judgements about individual cases" (215). The fundamental problem at the root of this classificatory project emerges once again: no such thing as "racial purity" exists, and for this reason, such attempts at grouping are flawed and highly suspect from the outset. The communications studies scholar Celeste Condit attributes this seemingly insatiable desire to categorize humans into groups based on this concept of "racial difference" reified by genetics to a Western tendency to understand the world through the lens of a "mind/body dualism" (246). She explains: "it is easier to imagine human biological difference as a product of different genes than as a product of different cultures, even though cultures produce the patterns of environmental toxins, nourishment, and stimuli that lead bodies to develop and decay in different ways" (Condit 246). I want to note that Condit's contention closely resembles a neo-conservative discourse within which "blaming the victim" becomes a common practice through which the dominant race and class is alleviated of guilt and responsibility for their production and maintenance of the living conditions that would "lead bodies to develop and decay in different ways."

I contend that the arguments put forth by these critics have reached a stalemate of sorts, in which the polemics orbit around what is posited as the central issue: whether or not there is any genetic basis for race-based medicine. This question alone takes the production of scientific fact by genetics for granted through its languishing within the bounds of a tired debate concerning whether or not the 0.012 percent of genetic variation between categorized "races" is substantial enough to potentially result in therapeutic advances for disease particular to this so-called racial difference.[81] While this sustained attention to the question of the critical import of genetic difference between races is problematic in the sense that this focus elides unacknowledged factors contributing to disease including unequal access to health care, education, housing, nutrition, etc., I suggest that a lack of close critical attention to the discourse and conditions of scientific production prevents us from recognizing drug research itself as a site in which systemic racist practices and beliefs are articulated.

A scientific indictment of systemic racism and class inequality as primary determinants of health—especially congestive heart failure—would undercut neoliberal capitalist political ideology in untenable ways. It becomes imperative, then, that the higher incidence of congestive heart failure experienced by people who self-identify as African-American is understood as biological rather than social in origin and cause. If this incidence of disease is understood as a symptom of a much larger structure within which class determines health, then the dominant ideological

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[81] The language through which this debate is carried out raises the spectre of its precursor in the context of state-administered violence: the "one-drop rule" that governed the legal classification of blackness in the US.

investment in the concept of genetic determinism becomes more clearly legible. This differential in incidence of disease is technologized and biologized in order to justify further investment in genetics research—for as long as genomic determination of disease remains not quite fully mapped or understood, then the public's hope for a technological fix to health problems remains ignited. The alternative—an admission that genetics works together with environmental factors in the determination of disease—would provide an unwanted scientific call for a redistribution of public spending and resources such that material inequalities that determine disease would be ameliorated. This option is simply politically untenable. The knowledge trafficked by the approval of BiDil is not embedded within a complicated narrative that acknowledges that cost-saving decisions on the part of NitroMed has produced a contingent and ideologically-suspect form of knowledge, but instead is understood as a discovery, or unearthing of some essential information, and the category of race gets reified.

Figure 5. One of NitroMed's advertisements for their new product BiDil.

On the Production of Racialized Knowledge

In order to reorient the debate away from a critical analysis of the narratives constructed by genomics as puppet of Big Pharma—a crucial site of debate, to be sure, but also one that has dominated critical work at the expense of other untapped sites of intervention—it is necessary to take one step back and attempt to understand the animating logic of the institutions that work to construct scientific facts in the first place. As Amri Johnson reports, less than one percent of tenured scientists working out of the National Institutes of Health (NIH) in the United States self-identify as African-American (12). This shameful number speaks to a stubborn set of barriers that should be understood as being maintained today, in large part, through the reproduction of a dominant ideology of colorblindness, which maintains white privilege in a particularly insidious manner. Further, as Ruth Müller suggests, the patriarchal history of science in the West is problematically bound up with conceptions of objectivity in science in the sense that all potential scientific researchers apart from "the bourgeois white man" have been excluded from the laboratory based on the assumption that their subject positions rendered them excessively "socially and emotionally bound, attached and tied" to contribute to the discovery of objective fact (3).

These insights invite an analysis of the structural barriers limiting participation in the scientific production of knowledge with consideration given to the following two points. First, the fact that the daily tasks of the laboratory, including data collection and analysis, are carried out largely by white[82] Americans: those who have a stake in the racial hegemony their research supports. Second, the fact that the

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[82] Please see Footnote 76 for further discussion of these statistics.

consequences of such a disproportionately low number of African-American and other racialized scientists contributing to the production of an institutional body possessing such enormous influence and capital as the NIH are dire and have not yet been fully recognized as such.

The consequences of this systemic exclusion are multifarious, but the particular consequence I wish to discuss is the deficit in the biomedical imaginary. I do not only contend that a deficit in African-American scientists will inevitably lead to an inadequate representation of African-American interests (as silenced by the dominant voice of science as pawn of white privilege), but also that the types of questions asked, the limits to inquiry, the potential of discovery, and the concepts employed with which to understand and visualize the problems at hand are in themselves intrinsically representative of the white privilege that continues to structure the institution out of which this research arises. I do not wish to promote any sort of essentialism that would assert that African-American scientists only develop research questions that benefit African-American interests, or that white scientists merely develop research questions that work against African-American interests. Following the work of Kenneth Manning[83], however, I believe that lived experience informs the production of scientific knowledge, and that if we want to produce scientific knowledge that represents the interests of all, and especially those who have experienced disproportionately high rates of disease, then science in North America needs to work quickly to reverse the epistemological trends produced by predominantly white laboratories.

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[83] See Manning, "Ernest Everett Just: The Role of Foundation Support for Black Scientists" in *The "Racial" Economy of Science: Toward a Democratic Future*. Ed. Sandra Harding. Bloomington: Indiana University Press, 1993. 228-238.

As Kahn suggests, the production of BiDil was a strategic endeavour from its very conception, carried out in the interest of securing substantial profit for NitroMed. Because NitroMed held a patent for a "race-specific" drug, it became increasingly desirable to obtain FDA approval for a "race-specific" indication in order to create the potential for new "race-specific" markets that would inevitably generate increased profits. In order to take advantage of its patent, NitroMed needed to construct a deficiency in the existing landscape of therapies in order to sell BiDil as a "breakthrough" miraculously appearing "just in time" to fill the artificial need constructed as therapeutic gap. This was not a tremendously difficult undertaking for NitroMed as a great deal of research indicating a disparity in rates of affliction by particular diseases according to "racial difference" already existed and was thus available for NitroMed to draw from (Kahn "Getting the Numbers Right" 475). As Kahn suggests, NitroMed found its "golden ticket" in a single statistic published in several leading scientific journals in 2001 and 2002 indicating a 2:1 ratio between racial groups' afflictions with heart disease ("Getting the Numbers Right" 475). This statistic showed that the mortality rate of African-Americans afflicted by heart disease was twice as high as the mortality rate of other groups in the US as defined by racial categorization. NitroMed pounced on this statistic, viewing it as the ideal infallible alibi that would allow the corporation to carry out its business plan under the guise of a "therapeutic solution" to an emerging epidemic. As Kahn contends, within the drug development and marketing team at NitroMed, "the statistic was being used to rationalize a search for race-based biological differences" as the necessary precursor to the attainment of a larger and more insidious goal: that of "reconceptualizing race in biological terms" ("Getting the Numbers Right" 477).

As Dana Tagaki has persuasively argued in the context of the debate over Asian-American university admissions in her book *The Retreat from Race: Asian-American Admissions and Racial Politics*, statistics are too often accepted at face value without subjecting to critical analysis the ways in which data is collected and knowledge is constructed. Tagaki provides a critique of the lack of critical attention directed towards the rhetoric and discourses that present statistics as truth through a variety of different methods, arguing that we are drawn instead to the perceived stability and intelligibility of empirical facts. The FDA approval of BiDil and the subsequent debate over "race-based" medicine should be understood as yet another instance in which the debate "pivoted not on the facts per se but on the interpretations of the facts" (Tagaki 11). This chapter aims to show that what Tagaki calls the "facts per se" are constructed under white hegemony and systemic racism, and thus what Tagaki calls 'facts' are *produced by* the act of interpretation in a culture of white hegemony and systemic racism. There are no "facts per se" that are then distorted.

NitroMed's strategic interpretation of the 2:1 ratio statistic indicating that the disparity in mortality from heart disease falls along the lines of "racial difference" was bolstered with dubious genetic "evidence" supporting a biological basis for the increased mortality rate. As Kahn contends, the research that resulted in the release of the 2:1 ratio statistic did not cite a cause for this disparity in mortality rates. Indeed, it would be impossible to determine a single cause for the increased mortality rate, especially considering the highly contested status of any purported genetic basis for categorization on the basis of race in the first place. NitroMed managed to mobilize this statistic to construct a deficiency in the pharmaceutical market by suggesting that the creation of a drug designed to the specifications of this niche—the particular susceptibility of African-Americans to heart disease—was not only possible, but necessary, and urgently needed.

Inclusion as Commodification

In *Inclusion: The Politics of Difference in Medical Research*, Steven Epstein argues that the institutionalization of the concept of inclusion in medical research can cause more harm than good.[84] In an exemplary operation of Barthes' ex-nomination, medical researchers had considered the white male research subject to be the "normative standard" in trials, and the research results obtained testing done on these subjects to be the baseline from which norms for populations constructed as deviant from this white male standard (e.g. racialized groups, women, children, etc.) would be compared. These 'deviant' groups were understood to be essentially different from the normative standard, and tailored treatment plans for these groups were developed accordingly (but always in relation to the standard). During the 1980s, advocates for these groups did the important work of lobbying to extend the right of participating in clinical trials as research subjects[85] extended to these previously-excluded groups, arguing that these groups could not be receiving the best possible medical treatment if their treatments were always a derivative form of a standard from which they might fundamentally differ. Inclusion in the testing phase was understood as purely

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[84] The doctrine of "cultural competency" has become *de rigueur* in North American health care settings at the beginning of the 21st century. Hospitals across North America are hiring "experts" in this area with the goal of training the entire hospital staff—from CEOs to cleaning staff—how to interact with patients and patients' families with cultural sensitivity. This could be characterized as the social/cultural 'flip side' of the genetic project of personalized medicine. This is a well-intentioned movement that is partially informed by the 'inclusion' paradigm that works to ensure that people of colour, women, children, and others previously excluded from clinical trials can participate in trials and glean benefits from them.

[85] Indeed, the clinical trial and approval processes in the US are already a highly rarefied echelon that is accessible to few. The ways in which access to participation in clinical trials is classed is not often acknowledged by health professionals.

beneficial[86] as it was equated with the ability to develop the best possible treatment. Epstein argues, however, that the biopolitical paradigm of inclusion works to biologize and essentialize difference as defined by researchers, and that as a result, the category of research subjects seeking inclusion is often permitted to participate in a trial for the purposes of profit-creation rather than therapeutic benefit to patients.

Demonstrating that the US has proven itself quite capable of producing scientific theories and data to justify racist practices, policies, and ideologies throughout its history (i.e. the use of craniometry to lend legitimacy to practices of slavery in the US), Troy Duster argues that the financial incentive to biologize race continues to increase, and not merely in potential profits through the sale of race-specific pharmaceuticals (495). Echoing Angela Davis' argument that the American prison industrial complex depends on the continued imprisonment of racialized people to remain profitable, Duster suggests that genetic research on inherited traits of "criminality" and genetic research on racial categories will converge, thus lending scientific justification to this racist practice (495). Duster writes:

> the next decade will witness an outburst of behavioral genetics research, buttressed by the molecular reinscription of race tying crime to biological processes, and then correlating those biological processes to race. It is not beyond conjecture that it will be an African-American who will lead the charge, fully supported by the Pioneer Fund or some

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[86] Marginalized identities were prohibited from participating in clinical trials as research subjects during the 1980s (and thus also excluded from the therapeutic benefit that sometimes attends this participation) following a shameful history of exploitation. The most infamous study of this kind in recent U.S. history is the Tuskegee Syphilis Experiment, which continued to be conducted even after the Declaration of Helsinki was established in 1964 with the aim of preventing the exploitation of research subjects through the doctrine of informed consent.

> equivalent well-funded, conservative think tank or funding source. (495)

Of course, not all scientific knowledge produced is ideologically identical to its funding source. But in cases in which science is employed post-hoc as a tool to justify racist practices, it becomes particularly harmful. The channels through which scientific discourse is trafficked are worth scrutinizing to assess their role in propagating these ideas. Even minor changes to news media reporting practices, educational institutions' teaching, and artistic and pop cultural engagements with scientific discourse would alter the ways in which this knowledge gets taken up. If details concerning the conditions under which the research was conducted could be provided, pointing to the contingency (rather than inevitability) of this knowledge, it could become possible to alter conceptions of science, and as a result, science might begin to be interpreted as a narrative developed within a particular context rather than as authoritative, infallible truth.

The FDA's approval of BiDil should be read as symptomatic of the following aspects of the culture of systemic racism and white hegemony out of which it emerged. First, race is understood as a natural, biological category rather than a social one, which works to legitimize social and political acts of racism. Second, this culture facilitates the construction of heart disease as a race-specific genetic pathology rather than a disease that is produced by poverty and inadequate access to resources that maintain health. Third, the conditions under which knowledge is produced get effaced; a disproportionately white group of scientists selects a cost-effective research variable of African-Americanness without taking into account the social and political implications of this selection of variable, and this decision gets affirmed and transformed into indisputable fact by the knowledge-constructing agency with an enormous amount of political power in our science-revering society: the FDA.

The spectacle of a pharmaceutical product being ushered in by the FDA to address such a pronounced articulation of insidious and pervasive structures of inequality endemic to social life throughout the US worked to obscure systemic causes of this disparity in mortality rates. The scandal of "race-based" medicine has garnered such a frenzy of attention that more long-standing and seemingly banal causes of higher rates of heart disease in particular populations—including systemic racism resulting in poverty, lack of access to adequate living conditions, health care, nutrition, education, etc.—are not addressed, and thus potential solutions to these urgent problems are not yet being imagined by the scientific community that possesses the resources with which to do this work.

Biological discourse trafficked through the approval of BiDil perpetuates the narrative of cause and effect that limits our understanding of the mechanisms at work in the development, treatment, and prevention of disease. This narrative is a normative one in that it maps disease onto an as yet unidentified genetic trait and prescribes a pharmaceutical solution for this alleged pathology, also moralizing the question of access to the drug: suggesting that once therapeutic benefit has been proven, denying patients access to this drug would do violence. Discursive constructions trafficked through scientific narratives do not merely produce a stratified set of treatment options, but they also produce profound material, economic, cultural, and legal implications outside the realm of health care.

Chapter Three: "Colonialism, Financialization, and a Social Determinants Understanding of Causation"

> Health and disease are no longer purely infectious in nature, but instead, social and environmental factors account for most chronic disease. (Darron Smith, "The Epigenetics of Being Black and Feeling Blue")

The Toronto private clinic Medcan entices customers to purchase its services through the slogan "Your DNA Doesn't Need to Be Your Destiny," suggesting that investment in preventative medicine can provide an escape from otherwise intractable biological destinies. Health care delivery in the U.S.—and increasingly in Canada—is beginning to operate through discourses of risk management and self-determination, and the medical subject is now interpellated not as "patient" or even "consumer," but as "investor." Personal health management is increasingly understood as a crucial component of personal financial management in a broad sense, as immaterial, speculative health futures gain standing as an important site of financial intervention. The logic informing the personalized health industry and the personal finance industry works to obscure these determinisms, presenting a paradigm in which genetic predisposition to disease, as well as social class, can be transcended through savvy investment, long-term planning, and pre-emptive risk management. These industries offer a vision of transformation through the liberal fantasy of infinite mobility, claiming to provide the means through which investors can transcend their social class and prevent future illness.

A cultural logic of atomistic individualism informs both the privatization of medicine in Canada and public health campaigns that address environmental determinants of health. The two prescribed responses to the presence of risk diverge significantly: the wealthy are interpellated as “health investors” and urged to take preventative measures against future disease, while marginalized and racialized communities are asked to take on the role of self-management to make incremental and necessarily short-term improvements to a set of living conditions actually determined by the multifarious effects of colonialism. Risk is managed by alternate strategies of prevention and blame. The pre-emptive logic of personalized medicine necessitates projections of future health.

For many Indigenous communities, this is a future of anticipating the persistence of colonialism, as well as the structural inequalities and environmental contaminants produced by persistent colonialism. The Canadian government is not held accountable for its role in creating these inequities through various colonizing strategies such as placing industrial sites of resource extraction on Indigenous land; rather, those whose health is compromised by this set of conditions are called to responsibility through a suggestion that hygienic neglect could be at fault for higher rates of disease in these communities. Personalized medicine is conceptually enabled by “a reconfiguration of subject categories away from normality and pathology and toward variability and risk, thereby placing *every* individual within a probability calculus as a potential target for therapeutic intervention” (Sunder Rajan 2006: 167). While everyone is targeted for personalized medical intervention, the particular site of intervention is striated through the modalities of class, racialization and gender. For the wealthy, the actionable site of medical intervention is constructed as genetic, while public health campaigns targeted towards First Nations, Inuit and Métis Indigenous children identify their responsibility for personal hygiene as the actionable site.

This chapter continues to explore the epistemic and social influences on the development of discourses of causation, turning to an analysis of the colonial power relations implicit in contemporary public health campaigns. State power in the neocolonial context of contemporary Canada appears and becomes legible in the form of discursive techniques rather than in the form of force, as it did earlier in the twentieth century, and particularly through the federal government institution of Indian Residential Schools. I focus on public health campaigns directed towards First Nations, Inuit and Métis Indigenous children as a case study of the sort of discursive technique that allows for the continuation of colonial forms of domination. In this case, the logic that is marshalled to justify the devaluation of Indigenous lives is speculative in character. This chapter traces the development of this speculative logic in the Canadian context and shows that the groundwork is being put in place for a transformation that could bring Canadian health care much closer in form to the much-maligned US health care system than is acknowledged at present.

Finance Capital and Colonialism

The co-constitution of financialization and colonialism can be traced back to the 18th century. In *Specters of the Atlantic*, Ian Baucom frames the current hyperspeculative moment of financialization as a later iteration of the financialized logic that animated the colonial period and carried on into the long 20th century. Baucom traces the history of the rise to prominence of speculation as mode of financialization that would eclipse the "actual" market exchange characteristic of commodity capitalism (2005: 46). His story begins with the marine insurance industry and its consequences for the 142 enslaved Africans murdered by the captain of the *Zong*, a ship that travelled from Accra, Ghana to Jamaica in 1781. The murder of 142 slaves on this voyage is emblematic of the shift to the logic of finance capitalism in 1781. The commodification of human lives through their classification as “cargo” is not what is at issue here as this practice was typical of commodity capitalism.[87] The

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[87] The early twenty-first century has seen the continuation of this practice of classifying human lives as “cargo” put onto ships to produce a profit through Libya’s human trafficking industry. On April 19, 2015, more than 800 refugees fleeing political conflict, poverty, and persecution in their home countries of Syria, Eritrea, Sierra Leone, Mali, Senegal, Ivory Coast, and Ethiopia paid 1000 Euros each to board an aged and precarious fishing vessel that left the port of Tripoli on April 18, bound for Italy, and the promise of political asylum in the EU. The ship capsized on April 19, and over 800 asylum seekers drowned. Unlike the 150 people killed in the Germanwings 4U9525 crash in the French Alps on March 24, 2015, whose deaths were properly mourned with ceremonies attended by heads of state and with enormous popular support, we are not likely to ever learn the names of the refugees killed in the Mediterranean Sea on April 19. The two accidents took place less than a month apart, in the same geographical area, and while the capsized ship killed more than five times the number of people killed in the plane crash, the lives ended by the plane crash were characterized as innocent and mournable (Butler) by international media because of privilege—class, race, and citizenship—while the lives ended off the coast of Libya will be added in the form of numbers to the ongoing tally of lives lost in the Mediterranean. More than 1700 refugees have drowned in the Mediterranean already in 2015, and the UNHCR has projected that number to climb to 30,000 refugees killed by the end of 2015 (Mark Rice-Oxley, “It is our antipathy towards migrants that kills in the Mediterranean”). Dan Hodges, a British journalist, has argued that the rising numbers of refugees killed in the Mediterranean cannot be characterized as “tragic” or “accidental,” but instead must be seen as an outcome made possible by EU cuts to rescue operations as well as anti-immigration policies that work to curtail the number of refugees arriving in the EU (not to mention the ways in which the drownings are also indirectly caused by European colonialism in Africa). Hodges critiques British politicians’ responses to the April 19 drowning as insincere, especially for the politicians who explicitly back anti-immigration policies. For these politicians, Hodges suggests, the drowned refugees were *murdered by policy*, and the outcome of the ship being capsized actually had the desired effect of limiting the number of asylum seekers—perceived as presenting a drain rather than a boost to state resources—arriving in Britain. Hodges points to the perverse way in which the outcome of the April 19 drowning represents a logical extension of this anti-immigration policy: “We have got our wish. The 900 will never set foot here. 900 jobs are safe. 900 houses available for local people. 900 hospital beds left open. 900 empty school desks.” To take Hodges’ conjecture even further, it can be argued that there is a form of speculation at work in the Libyan human trafficking industry. As in the case of the *Zong*, the human lives as ship cargo are assigned a speculative future value. Unlike the case of the *Zong*, though, the refugees are not seen as possessing productive capacities, use or exchange value in the same way that slavery violently defined its subjects as *essentially* productive. Instead, they are seen to represent need, or a negative biovalue. Still, the traffickers earn enormous profit. As Rice-Oxley estimates, accounting for the cost of the ship, the traffickers who charged

transition to a financialized logic is signaled by the subjection of life aboard the *Zong* to a speculative value established by the insurance industry, which was then held up in court after those aboard had died (139). The decision to murder the slaves aboard the *Zong* was made precisely because they had been assigned a speculative value, and were thus understood as "suppositional entities whose value is tied not to their continued, embodied, material existence but to their speculative, recuperable loss value" (139). Without the financialization of the marine insurance, the slaves aboard the *Zong* would almost certainly not have not been murdered, even under the same conditions of overcrowding, precisely because their value as living slaves—assigned an exchange value as commodities—would be negated by their deaths. The legal trials following the arrival of the *Zong* in Jamaica did not concern a charge of murder but rather sought to establish the insured value of those murdered and arrange the rightful delivery of remuneration to slave owners in Liverpool who had insured the dead. As Baucom notes, we have not yet fully considered the social, legal, and political consequences of financialization, or the way that transformations in valuation shaped a wide array of practices and norms.

At the time that the *Zong* set sail, the marine insurance industry sold insurance on a ship's cargo for the duration of the sea voyage, but not beyond the ship's arrival at its destination. The insurance was intended to protect property owners against damages to cargo that might take place while at sea, according to the principle of the "general average," which was designed to ensure the safe delivery of *the majority* of a ship's cargo (Baucom 136). When some of the enslaved Africans—classified and

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the refugees who drowned on April 19 1000€ each to board the ship likely brought in "a return on investment of almost 6000%" (Rice-Oxley). The complicated processes through which biovalue is calculated and is striated across race and class lines is at play in the development of public health policy in Canada. Though state policies' cost-benefit analyses are far from transparent, these logics are expressed in discursive form.

insured as “cargo”—on board the *Zong* became ill during the trip due to overcrowding and malnutrition, the captain decided to “sacrifice” and throw overboard 142 slaves in order to ensure the safe delivery of the remaining healthy slaves. What are the consequences of a political and economic revolution through which humans can be assigned “an utterly dematerialized, utterly speculative, and utterly transactable, enforceable, and recuperable pecuniary value” (Baucom 139)? The assignment of value is a structural impediment to reflecting particularity and variation. The disavowal of variation propagated by typologies, especially racial ones, ordered processes of speculation.

Apart from the specific way in which a speculative value was assigned to racialized bodies aboard the *Zong*, speculative valuations of racialized bodies and their labour power were central to slavery and colonialism more generally.[88] Different sources of labour power were evaluated—in the contexts of slavery and colonialism—for their potential to produce surplus value, and scientific calculations of biovalue that were often race- and class-specific formed a crucial component of these evaluations.[89] Sometimes these scientific calculations of biovalue took a more explicit form as race science, but more often these calculations found expression in more subtle and less identifiable forms such as state policies.[90] However, the scientific study of typologies that provided bounds and empirical values to the sets of

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[88] For example, the scientific cementing of racial typologies was central to the slave trade, which assigned different prices to slaves according to values attached to measurements such as age, sex, and experience, in addition to ethnicity as measured by skin colour.

[89] See, among others, Antje Kühnast’s account of the British and German imperial development of scientific measurements through which different racialized groups were evaluated by colonial governments for their labour potential.

[90] See, among others, Emmanuelle Sibeud, "A Useless Colonial Science? Practicing Anthropology in the French Colonial Empire, circa 1880–1960" *Current Anthropology* 53.S5 (2012): S83-S94.

power relations—again, slavery and colonialism—that required them has profoundly influenced the development of financialization and speculation.

The political and scientific construction of racial typologies has functioned as one of the conditions of possibility for speculation—through slavery and colonialism—since at least the 18th century. Systems of classification were foundational developments in colonial regimes, sometimes aimed at limiting possibilities for resistance by the colonized. In the context of the history of speculation, the ideological entrenchment of typologies allows for a standardization of valuation. As Baucom chronicles, neither the British slave owners nor the insurance underwriter who placed a monetary value on each slave's life had ever seen the slaves from whose deaths they would profit (15). As speculation became the dominant mode of valuation, the practice of assigning "imaginary value" to objects and living beings based on their type became the accepted industry paradigm, through which "the typical triumphs over the particular" (Baucom 16, 40). Such typologies ordered and continue to order colonial understandings of Indigenous peoples in Canada.

How is the financialized logic of the trans-Atlantic slave trade relevant to my consideration of uneven access to resources in the Canadian context? Although Indigenous peoples were not purchased and sold by European colonialists, their land was exchanged as property. This land provided Indigenous peoples with the means to life: spiritual and economic support, food, water, housing and medicine. Colonial institutions such as residential schools operated according to a financialized logic, even in the absence of an official insurance industry, by assigning value on the basis of a speculative estimation of future profit. However, unlike the context of the trans-Atlantic slave trade, in which slaves were assigned a speculative value based on their future labour, the value assigned to Indigenous peoples by the colonial state was determined as a negative value, or liability. Indigenous people factored into colonial calculations to the extent that they diminished the value of the land and resources that the state planned to expropriate. The speculative value assigned to Indigenous lives and communities is subordinate to the value assigned to their land (Irlbacher-Fox; Gehl). The colonial state was so certain of this calculus—that land would be more valuable if it was not occupied by Indigenous people —that it worked to construct this fantasy as historical fact, “through racist civilizing discourses, such as the discovery doctrine and *terra nullius*, which uphold the political and legal right for colonial powers to conquer supposedly barren Indigenous lands” (Walia). The colonial calculation of risk projected maximal profits from the forcible assimilation of Indigenous peoples, and played a role in enacting cultural genocide. In this chapter, I argue that Indigenous lands in Canada are financialized in this particular mode because they are “insured” for their speculative resource extraction value.[91] As Audra Simpson has argued, colonial governments act according to the principle that land will increase in value once it is vacated of its Indigenous inhabitants.[92] I explore how

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[91] For more on the role of speculation in the settling of Canada, see Bruce Braun’s article “Producing Vertical Territory: Geology and Governmentality in Late Victorian Canada.” Braun argues that thinking of the earth as geology led to the possibility of speculation in Canada—specifically, the act of valuing the land as an entity separate from its Indigenous inhabitants and caretakers. He contends that central to the colonial act of settling Canada was the way in which the land took on value with respect to other knowledge discourses that were circulating at the time, particularly that of geology.

[92] Simpson’s work on how this principle is indirectly responsible for the disproportionately high rates of murdered and disappeared Indigenous women in Canada is discussed further in the Conclusion to this dissertation. See also James Scott’s *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed* and Alexandra Widmer’s “Seeing Health Like a Colonial State: Assistant Medical Practitioners and Nascent Biomedical Citizenship in the New Hebrides.”

this logic finds expression in Canadian public health campaigns directed towards Indigenous communities in Canada.

Multiple forms of cultural imperialism continue today, animated by institutional channels such as federal public health campaigns.[93] One of the primary mechanisms of cultural imperialism is the production of subjectivity; thus, this chapter traces two forms of subject formation determined by "the colonization of human subjectivity by finance capital" (Baucom 139). They are the "entrepreneur of the self" and the "health investor."

The Entrepreneur of the Self

The persistence of government practices and policies, as well as cultural institutions, that generate colonial inequities relies upon the production of divergent subjectivities that legitimize these inequities through the establishment of moral norms. The relation between colonialism, financialization, and health occurs in the context of a "neoliberalism [that] installs speculation at the very core of production" (Cooper 2008: 10). As I will show, this striation in the production of subjectivity reinscribes the power relations of colonizer/colonized through the uneven dissemination of neoliberal discourses by Canadian medical institutions.

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[93] I want to emphasize that the colonial state's attempts to manage Indigenous communities have been met with courageous acts of protest and resistance ever since the settlers' arrival, most recently through the Idle No More movement. Initiated in 2012 in Saskatoon by Nina Wilson, Sheelah McLean, Sylvia McAdam, and Jessica Gordon, Idle No More was formed in response to the Canadian government's passing of the omnibus Bill C-45, which cancelled environmental protections for waterways and proposed structural changes to legal forms of governance in First Nations communities. The movement has received unprecedented popular support in its aim to bring to light the relationship between resource exploitation and ongoing forms of colonial violence and forcible assimilation that have been silenced and censored by national archives, museums, curricula and other forms of knowledge production.

In *The Birth of Biopolitics*, Foucault contrasts the classical formulation of *homo economicus* proper to liberalism with a new conception of *homo economicus* that arises under neoliberalism. In the latter formulation, the subject becomes the entrepreneur of the self, so that the potential for capital generation is not measured as labour power that can be bought and sold, but rather as the subject's capacity as an "abilities-machine" that can produce income as an "enterprise for himself" (Foucault 2008: 225). A model of self-sufficiency, the atomized subject as entrepreneur of the self does not simply engage in acts of consumption to gain satisfaction; rather, the entrepreneur of the self produces both capital and satisfaction for the self. In this closed-circuit operation, gain and loss are both attributed to the success or failure of the entrepreneurial endeavour; responsibility rests solely on the entrepreneur's shoulders. As Maurizio Lazzarato points out, however, Foucault did not take into account the changes wrought by financialization and their consequences for the production of subjectivity. Prior to the diminishment of the welfare state, the degree of risk assumed by individuals was proportional to class and property ownership; members of the working class generally had their wages protected and needs accounted for by a robust social safety net. Financialization has brought about an inversely proportional relationship between risk and property ownership as property is more protected than ever and risk is transferred to those who have the least to lose (Lazzarato 2009: 17). Lazzarato invites consideration of how "non-owners" must now "rely on their earnings alone, often blocked or eroded because of the systematic reduction in social expenditures," while owners "can shift risks onto the stock market or insurances" (17).

Lazzarato draws attention to the role of morality in transforming social relations through privatization and the diminishment of the welfare state in Europe and North America. A new set of social relations is configured through the division of populations into one of only two forms of subjectivity: debtor or creditor. This financialized process reorders sovereign, disciplinary and biopolitical power as conceptualized by Foucault (Lazzarato 2011: 104). The need for a distribution of resources through social programs administered by a welfare state is itself pathologized, reframing as "debts" what were understood to be rights (Ibid). The subjectivity of the debtor is characterized by guilt and an indentured devotion to an attendant set of self-improvement practices (Ibid). Lazzarato argues that the type of resources to be managed and optimized by each "entrepreneur of the self" is determined by his or her class position on the credit-debt spectrum (51). The subjectivity of the debtor involves the production of an affective state of guilt and the assumption of "responsibility for poverty, unemployment, precariousness, welfare benefits, low wages, reduced benefits, etc., as if these were the individual's 'resources' and 'investments' to manage as capital, as 'his' capital" (51). In the Kaiser Permanente advertisement below, health is figured as the product of a particular set of moral attitudes, including that of optimism (in spite of a set of living conditions for most that warrant weariness, cynicism, exhaustion, and depression). Again, an equal distribution of agency is assumed here: as though everyone can make the personal *choice* to be healthy, but some of us don't choose to.

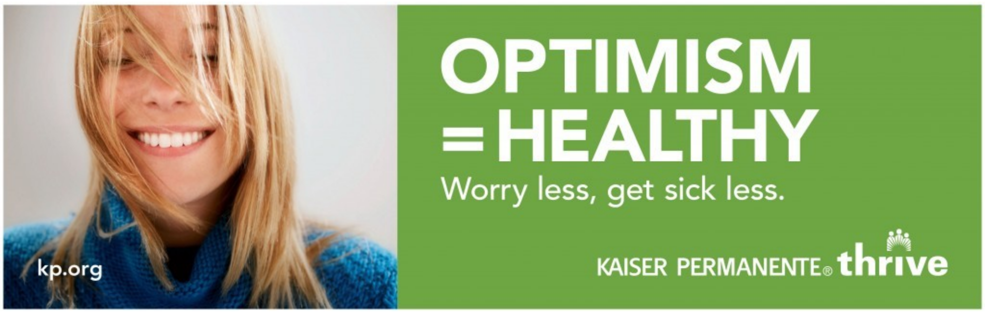

Figure 6. An advertisement for the American HMO Kaiser Permanente.

What mechanisms of subject formation best serve a state that finances universal health insurance for its citizens? Which tools of management are implemented to "lighten as much as possible the burden…[poverty] imposes on the rest of society" (Foucault 1980: 169)? The imperatives of public health campaigns are avowedly those of prevention and early treatment, with the stated aim of alleviating the suffering of the ill, as well as the economic burden they pose to taxpayers.

On the Financialization of Medicine

> The present is governed, at almost every scale, as if the future is what matters most. (Adams, Murphy, and Clarke 2009: 248)

The Canadian financial institution Scotiabank's slogans, "You're Richer Than You Think" and "Bright Future," appeal to the liberal fantasy of class mobility. They suggest that it is not structural barriers that enforce class divisions and an unequal distribution of wealth, but instead a lack of foresight, planning, risk management and good investment. The social institution of medicine in North America is informed by the same logic: an epistemic erasure of the structural inequities that distribute resources unevenly in favour of a narrative that positions health as equally accessible to everyone. Here health is a characteristic of the proactive individual who invests resources in a "healthy future." In his history of the privatization of American medicine, Paul Starr chronicles the development of Health Maintenance Organizations (HMOs) according to Fortune 500 logic (1982: 400). In order to ensure the expansion and success of this industry, health needed a new definition. Once defined simply as a passive state conceptually separate from morality and characterized by "the absence of disease," health is now associated with pre-emptive action (Guerero 2010: 10): the acquisition of knowledge about future health through genetic testing, and preventative measures to forestall disease.

Health is no longer understood as a concept confined to the realm of medicine. Just as medicine is becoming financialized, finance is being medicalized. Finance prescribes a particular lifestyle, or set of ideals that ought to inform all decisions and actions. The potential penalty for failing to follow this lifestyle is catastrophic loss or affliction with financial dis-ease, a corollary of which could be diminished access to health care and the treatment of physical disease. The personalization of finance makes specific demands of the subject as investor. As Randy Martin argues, financialization extends the realm of the financialized subject far beyond the figure of the corporate CEO investor (2002). It is no longer merely the wealthy; "ordinary people are invited to participate in that larger abstraction called the economy" and interpellated as investors when "a new set of signals are introduced as to how life is to be lived and what it is for" (Martin 2002: 17). Martin and Max Haiven (2011) both draw attention to the affective structures through which financialized forms of subjectivity are produced. Finance is no longer relegated to discussions of the economy as an entity that is external to daily existence; as "the management of money's ebbs and flows," finance "presents itself as a merger of business and life cycles, as a means for the acquisition of self" (Martin 2002: 3). Our work and everyday lives are oriented towards finance as a larger structure that directs our decisions and produces meaning. A range of issues we face, from social, cultural, scientific and medical realms, are considered in relation to investment, debt, and propensity for growth and expansion. The speculative form of finance capital means that its ideological effects are distributed equally across class divisions, "function[ing] as a weapon of social discipline and transformation," even if its material effects remain tremendously unevenly distributed (Haiven 2011: 115).

In their discussion of the history of derivatives, Edward LiPuma and Benjamin Lee draw attention to the logics of preemption and self-management informing early futures contracts that allowed investors to "hedge and speculate on the risk associated with agriculture and mining" (2004: 34). The "personalized medicine" offered by private clinics—including genetic sequencing and full body scans—operates by the same logic in the sense that the consumer of personalized medicine purchases what is framed as a reduction in the risk of developing incurable disease later in the consumer's life. The subject of speculative medicine pays for testing and preventative measures that are not required to be "healthy" at the moment they are administered, in exchange for assurance that risk of future illness can be lessened through preventative measures. The "counterparty to the trade," the health insurance industry informed by genetic science, offers speculation as science (LiPuma and Lee 2004: 35). Like trade in commodity futures, "[o]ne side of the same trade may be the soul of prudence, the other pure speculation" (Ibid). While the same science of statistics is used to calculate probability in financial and genetic forms of speculation, the risk of financial loss is very different from the risk of developing a disease (Porter 2000). As the scientist Hans-Jürgen Bandelt and others argue, however, scientists' understanding of the role that SNPs—single nucleotide polymorphisms are the genetic units analyzed for risk factors in genetic testing—play in the development of disease is merely provisional, and constantly changing as additional studies are completed. For example, what is currently considered to be an indicator of substantial risk for developing Alzheimer's disease might soon be revised as research results alter our understanding of the factors that cause this disease; substantial risk may be reclassified as a minimal or negligible risk (Bandelt et al. 1246).

In the next section, I draw attention to recent articulations of what can be characterized as the "financialized imagination" (Haiven 2011) in the context of debates over social services, regulation, and expanding and reversing processes of privatization in the United States. I point to the role of financialization in producing a new common sense that frames the market distribution of resources as a more equitable form of distribution than state distribution of resources. While many Canadians still hold a rosy view of the Canada Health Act and Canadian Medicare as vastly more equitable than privatized health care distribution in the US, the gap between the two systems is gradually narrowing.[94] It is for this reason that I evaluate the role played by speculative logic in the realm of health care in the US before

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[94] It is difficult to make general statements about health care policy in Canada because health care remains a provincial responsibility, and thus policy, practices, and access vary greatly from province to province. It is, however, possible to assess how federal government funding for health care has changed under the tenure of Prime Minister Stephen Harper's government. While most Canadians—with the exception of rural communities and Indigenous communities—have much better access to health care than most Americans do, the long-cherished gap between the two is slowly shrinking. Since Harper's election as Prime Minister, the federal government has been steadily dismantling Medicare and creating legal space in which the profit motive can increasingly determine the shape of health care in Canada. A more explicit example of this is the 2005 Supreme Court decision in the Chaoulli v. Québec case that legally sanctioned the opening of private medical clinics in Québec. Less easily identifiable as a shift towards health care policy with speculative logic at its core, though, was a change in CIHR research funding structures under the Harper government requiring health researchers to propose projects together with corporate partners, so that there are now executives from the pharmaceutical industry—trained in business, not science—sitting together with scientists on CIHR research boards vetting proposals. This particular shift alone will significantly change the character of scientific knowledge—and subsequently, policy—produced by funded proposals in Canada in the sense that considerations of speculative value and investment potential now literally have a seat at the table. Other previously state-run sectors of health care in Canada, such as long-term care homes for seniors, have started to be privatized under the Harper government, so that the profit motive has infiltrated other sectors and has opened up legal space for speculative calculations of biovalue to significantly shift the logic and practices through which health care is delivered in Canada.

turning to the sites in which speculative logic is rearing its head in the Canadian context.

Assigning Responsibility

> The notion of 'health' as something that can only be accomplished through scientific rigor simultaneously emerges alongside scientific practices that sometimes conceal and arbitrate social practices of inequality and erasure, all the while claiming to 'fix' certain problems. Health can sometimes become a mechanism of politics by embedding itself in the world of science, and by distinguishing itself from its comparative counterparts: non-science and nonsense. (Vincanne Adams 2010: 40)

For seventeen years, James Verone's job was making deliveries for the Coca Cola corporation. During this time, his health care needs were met by the employee health insurance provided by his employer (Pilkington 2011). When Verone was laid off by Coca Cola, he lost both his job and the mechanism through which he could receive medical treatment. Unable to secure further employment and suffering from multiple chronic medical conditions, the 59 year old began to consider alternative methods of obtaining health care. On June 9, 2011, Verone robbed a local bank for $1.00, then sat quietly and hopefully waiting for police to escort him to prison, and, eventually, to an appointment with a physician. In an effort to explain his actions, Verone sent a letter to the local newspaper in his hometown of Gaston, North Carolina, contextualizing his decision and stating "I am of sound mind but not so much sound body" (Pilkington 2011). With high rates of unemployment and decades of privatization and tax cuts having depleted social services' ability to support the unemployed, many Americans have few sources of support to turn to. Unable to secure employment or social support, some have planned petty crimes with the aim of securing a route to imprisonment—and the shelter, nourishment, and health care services that come with it. Individuals in several US states have staged bank robberies, handing cashiers notes requesting a single dollar and explicitly naming the act a "federal bank robbery" with the aim of being sent to a federal prison (Frazier 2011). These individuals have frequently noted their urgent need of health care.

Debates concerning the state funding of social and material infrastructure reveal the pervasiveness of finance's ideals of autonomy, self-management, and, most notably, the subject as investor. The particular form of investment imagined here is a radically independent one that disavows the interconnectedness of the market with national unemployment rates, social, material, and environmental infrastructures, and other conditions of possibility for investment. The subject-investor neither contributes to nor draws from collectively held resources. Embracing the fantasy of utter independence, the subject-investor despises "government handouts" and works within an atomized epistemic and temporal space that focuses on providing for a single life span. It was this particular model of the subject-investor that was so threatened by Obama's now-infamous comments made on July 13, 2012 while campaigning in Roanoke, Virginia. The figure of the small business owner exemplifies the economic-turned-social values of self-management, autonomy, and entrepreneurism of financialization. Already lacking the clarity and eloquence of the speech by Elizabeth Warren that Obama was referencing in Roanoke, the Republicans then spun his words into the darkest, most menacing threat to finance: the rhetorical undoing of the American subject as autonomous, entrepreneurial self-manager. If the development of business is dependent upon collectively held resources, and the business owner/investor is required to relinquish profits to the state in the form of taxes, or, worse, mandatory government health insurance, then finance is hindered.

Attempting to contextualize his plan to raise the top-tier income tax rates in order to reduce the national deficit and fund social programs, Obama tried to justify his promotion of taxation by pointing to the supportive role of publicly funded infrastructures to the American economy in general, and Americans' ability to build small businesses in particular. Referring to existing support for progressive income taxation, Obama urges his audience to consider the material basis of support that drives the economy but has no place in neoliberal ideals of autonomy and self-management:

> There are a lot of wealthy, successful Americans who agree with me -- because they want to give something back. They know they didn't -- look, if you've been successful, you didn't get there on your own. You didn't get there on your own. I'm always struck by people who think, well, it must be because I was just so smart. There are a lot of smart people out there. It must be because I worked harder than everybody else. Let me tell you something -- there are a whole bunch of hardworking people out there. If you were successful, somebody along the line gave you some help. There was a great teacher somewhere in your life. Somebody helped to create this unbelievable American system that we have that allowed you to thrive. Somebody invested in roads and bridges. If you've got a business -- you didn't build that. Somebody else made that happen. The Internet didn't get invented on its own. Government research created the Internet so that

> all the companies could make money off the Internet. The point is, is that when we succeed, we succeed because of our individual initiative, but also because we do things together. There are some things, just like fighting fires, we don't do on our own. I mean, imagine if everybody had their own fire service. That would be a hard way to organize fighting fires. (Office of the Press Secretary 2012)

Romney's Republicans made much of this opportunity to warn of what they saw as big government's propensity to inhibit the growth of free markets, but I focus here on the way that Obama's perceived inclination to curtail self-management and investment becomes the focal point of the debates over Obamacare, and especially how the valuation of self-management is creeping in to funding decisions and the regulation of medical research and health care in Canada, as well.

The Republican response to Obama's speech captures the *Zeitgeist* of this political moment and highlights the logic—an abhorrence of a state-run system that might provide "handouts" to "free-riders," increasing costs to taxpayers—that informs the current restructuring of health care in Canada under Prime Minister Stephen Harper. As John Avlon reminds us in his article "Why the Right Turned Its Back on the Individual Mandate," Obamacare is merely the most recent iteration of a long history of attempts to legislate publicly-funded health care in the United States, and, notably, a modified version of a Republican proposal put forth in 1989 by the Heritage Foundation, a think tank developed by Reagan. The logic of the Republican initiative was almost pedagogical: that the costs of Medicaid, Social Security, and other state-run programs could be decreased if users of these programs modified their behaviour (Avlon 2012). Avlon writes: "we have a hole in the social contract, where a lack of individual responsibility causes great financial costs for society as a whole in the realm of health care" (Avlon 2012). This is what Carolyn Tuohy calls the "moral hazard" of state-run insurance: "the likelihood that individuals will overconsume health care since the costs of care for any individual are spread across the pool of insured individuals" (1999: 18). The Heritage Foundation proposed the principle of self-management to counteract these rising costs: "[t]he solution…was to put an end to fiscally irresponsible freeloaders by advancing the principle of individual responsibility" (Avlon 2012).

Those who argued against the regulation of the health insurance industry proposed by the Patient Protection and Affordable Care Act (PPACA) accused the Obama administration of attempting to limit individual freedom, and even of implementing a system that would distribute health care resources less equitably than free market insurance industry has. In an article published by the conservative think tank and promoters of the theory of intelligent design, the Discovery Institute, Wesley Smith projects that the implementation of the PPACA will transform the United States from a harmonious and equitable society to a "Hobbesian war of all against all" in the sense that government regulation is imagined to limit what was an infinite supply of resources. It seems that the anxiety surrounding the perceived limitation of individual freedom and the potential for self-determination results in leaps of logic, as the threat to complete self-management and control over personal investments is understood as directing resources away from marginalized groups. Smith suggests that government regulation of health care "unleashes Darwinian impulses that tear at the very unity of society," and that the PPACA "will soon have us fighting each other like a pack of hyenas battling over a small carcass" (Smith 2012).

It is the prospect of having to make personal sacrifices for the welfare of others that is most threatening to the libertarian perspective. As Martin writes, “[t]he rampant individualism of profit or maximization of ends disavows the very socialization upon which it depends. This was always the manager’s secret, that others were to be relied upon to do the work. Now this secret is to be revealed to all the selves who risk planning the future” (Martin 2002, 117). The logic of investor as proper agent of risk management and speculation informs Smith’s suggestion that only upon the implementation of the PPACA will individuals’ choices begin to affect the welfare of others: control and predictability are inversely proportional to the number of variables in the investment, and government “meddling” in matters such as health care is seen to limit the individual’s investment agency. Regulation makes navel-gazing much more dangerous. We can no longer safely “securitize” our investments: “there is no such thing anymore as ‘mind your own business’ because anything our neighbors do that can increase health care costs becomes our business” (Smith 2012). Smith reproduces the myth of publicly funded social services as limiting the freedom of the individual. Worse still, according to this logic, is Obamacare’s perceived limitation to the freedom of the HMO corporation. The freedom of the individual is understood as directly related and analogous to the freedom of the corporation, and the PPACA is perceived as a threat to both. The liberal logic here is that individuals must not conceive of or work towards any notion of the ‘public good’, but instead endeavor only to pursue their own interests without any consideration of the public good, and as a result, everyone will benefit; it is only through each individual’s myopic focus on the self that economic liberalism can provide for all.

A handful of start-up companies are recruiting physicians to resist the PPACA by selling medical services through the newly coined "direct primary care" industry in the United States, which is designed to respond to Obamacare by "fighting to bring transparent prices and market forces back to health care" (Epstein 2013). These companies plan to provide business infrastructures through which "physician-entrepreneurs" can evade "government interference" in their practices. Scott Atlas of the politically conservative Hoover Institution at Stanford University argues that the implementation of the PPACA may lead to a US "brain drain" as physicians flee legislation that he projects will "drive up prices and block innovation" (Epstein 2013). Atlas argues that physicians go into the profession precisely because they "want autonomy," and that in addition to restricting intellectual freedom, the PPACA will also "drive up costs and erode quality" of health care delivery in the US. This libertarian logic of government regulation inhibiting the distribution of resources is articulated again here, as the economist John Cochrane characterizes this desired free market health insurance as "individual, portable, life-long, guaranteed-renewable, transferrable, [and] competitive" (Cochrane in Epstein 2013). This model of health care much more closely resembles a financial investment than the type of interaction we associate with the delivery of therapeutic medical treatment. There is a strange articulation of concern of inequality in the PPACA's distribution of health care, suggesting the government regulation will create health care shortages but not alleviate current forms of inequality. At the same time, the investment model of health insurance is described as though it is equally accessible to all, which paves the way for those without access and who suffer disproportionately from certain illnesses, to be blamed for their predicaments.

The Health Investor

> Modern technology as well as modern social science provided the means for constant social improvement as the nation-state form developed, constructing for citizens an imagined future in which health was to be an endless horizon of better living and part of an increasingly secure world. (Masco 2010: 140)

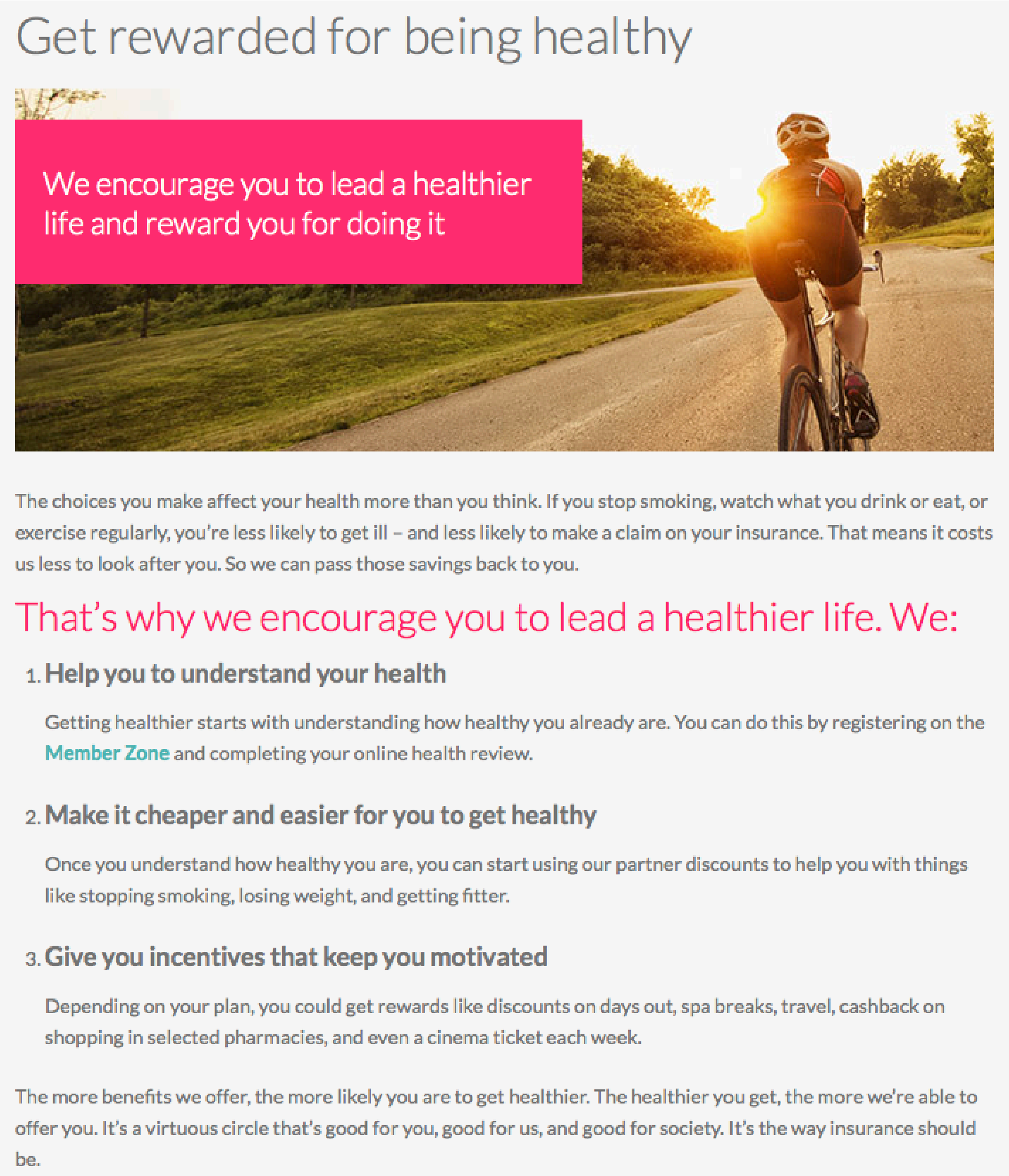
Debates concerning the state funding of social and material infrastructure reveal the pervasiveness of finance's ideals of autonomy, self-management and, most notably, the subject-as-investor. The form of investment imagined here is a radically independent one that disavows the interconnectedness of the market with national unemployment rates, social, material, and environmental infrastructures, and other conditions of possibility for investment. The subject-investor neither contributes to nor draws from collectively held resources. Embracing the fantasy of utter independence, the subject-investor despises "government handouts" and works within an atomized epistemic and temporal space that focuses on providing for a single lifespan.

Martin addresses the prevalence of this logic and its importance to the construction of "investor" as new form of subjectivity:

> Today, instead of a consumer-defined middle class, the population is divided into the self-managed and the unmanageable. An articulation of the state with finance, this initiative of the rule amounts to a shift away from citizens and consumers and toward investors, and as a new way of framing participation in public life and social policy as a public good. The investor becomes a model for the ideal kind of beings, who manage their affairs and take care of their own future. (2007: 8–9)

It is this idea of a reframing of civic duty as a completely atomized existence through which the self-reliant individual never needs to make demands of anyone else, not least a government social safety net, that underlies both these objections to publicly-funded health care and the personalized medicine industry more generally. According to Smith, health care delivery in the United States doesn't require improvement: he describes a society of self-determining individuals exercising freedom of choice within atomistic bubbles. The investment model of health insurance is described as though it is equally accessible to all, which paves the way for those without access, who suffer disproportionately from certain illnesses, to be blamed for their predicaments.

But in order to lay the groundwork for a narrative through which some can be blamed for their predicaments, a space needed to be created in which the model citizen, the upstanding "health investor," could be praised for careful and diligent maintenance and the staving off of disease. A 2015 advertisement for Vitality life insurance (Figure 2) illustrates the insurance industry's enthusiastic embrace of this normative model of the "health investor." The British company Vitality brands itself as the company that is "changing life insurance for good," boasting that it is the first and "only life insurer that gives you discounts and rewards for being healthy" (Vitality Life). The company speculates that it will not need to make as many large life insurance payouts for the early deaths of its clients if its clients minimize their "risk factors" for the development of environmentally influenced disease. This is a fascinating update of Henry Ford's practice of sending inspectors to his employees homes to evaluate the employees' behavioural "risk factors" and to ensure such "lifestyle risk" was minimized in order to maximize the employees' productivity and the corporation's profit (Martin 30). The Vitality Life Insurance company is essentially taking the same measure to minimize risk and maximize profit, but in the era of neoliberalism, financialization, and the ideological entrenchment of personal responsibility for health, the ad emphasizes the power of individual agency in further enhancing “the good life” for those who can already afford to live it.[95]



Get rewarded for being healthy

We encourage you to lead a healthier life and reward you for doing it

The choices you make affect your health more than you think. If you stop smoking, watch what you drink or eat, or exercise regularly, you’re less likely to get ill – and less likely to make a claim on your insurance. That means it costs us less to look after you. So we can pass those savings back to you.

That’s why we encourage you to lead a healthier life. We:

1. **Help you to understand your health**

   Getting healthier starts with understanding how healthy you already are. You can do this by registering on the Member Zone and completing your online health review.

2. **Make it cheaper and easier for you to get healthy**

   Once you understand how healthy you are, you can start using our partner discounts to help you with things like stopping smoking, losing weight, and getting fitter.

3. **Give you incentives that keep you motivated**

   Depending on your plan, you could get rewards like discounts on days out, spa breaks, travel, cashback on shopping in selected pharmacies, and even a cinema ticket each week.

The more benefits we offer, the more likely you are to get healthier. The healthier you get, the more we’re able to offer you. It’s a virtuous circle that’s good for you, good for us, and good for society. It’s the way insurance should be.

Figure 7. An advertisement for the British life insurance company, Vitality Insurance.

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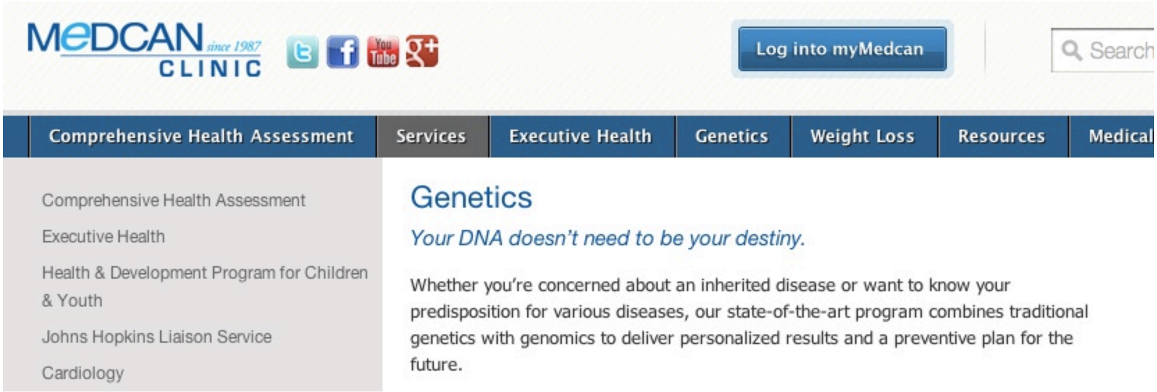
[95] This Vitality ad targets the wealthy “health investor” who is interested in life insurance as an investment opportunity, and not as a necessity, or an unaffordable luxury, as is the case for many marginalized would-be “health investors” living in poverty. The investor targeted by this ad possesses the time and the means to “invest in health” through a gym membership, a personal trainer, bike rides, and “spa breaks.”

While health care in Canada has been understood as less striated than the long-privatized U.S. health insurance industry, the market for speculative medicine in Canada is growing. For example, Toronto's "Private and Executive" medical clinic, Medcan, sells the idea of medical self-determination by playing on potential customers' fears of future disease and anxieties concerning the purported deficiencies of public health care. Medcan explicitly frames its services as "an investment in health" (Medcan). Proclaiming "Your DNA Doesn't Need to Be Your Destiny," the clinic sells the idea of upward mobility—of class and health—through the suggestion that pre-emptive measures taken by medical professionals can rewrite our destinies.



Genetics

Your DNA doesn't need to be your destiny.

Whether you're concerned about an inherited disease or want to know your predisposition for various diseases, our state-of-the-art program combines traditional genetics with genomics to deliver personalized results and a preventive plan for the future.

Figure 8. Toronto's "Private and Executive" Medcan Clinic.

This transformation goes beyond the realm of health. Financialized medicine understands behaviours, attitudes, and "lifestyle" as key to transcending a fate that others might passively accept. Suggesting that preventative medicine can support and enhance the attainment of financial goals as well as medical goals, Medcan locates its services as a crucial component of a larger "proposal for how to get ahead" (Martin 2002: 3). Medcan is working to expand its target market beyond their corporate clientele, just as direct-to-consumer genetic testing companies re-marketed their services by lowering prices and targeting middle class consumers after the initial target market of Silicon Valley millionaires became saturated. The clinic's website states that “the Medcan Clinic is dedicated to keeping busy people healthy,” and while “busy” is evidently a euphemism for “wealthy,” this characterization also speaks to shifting conceptions of social value (Medcan). Busyness is in itself a goal to work towards in finance culture. If we are not busy, we are not working towards an optimized future—the “good life” that can be attained through prudent investment, risk management and other proactive behaviours. Again, health is imagined as utterly individual while social determinants of health and the role of structural inequities are effaced. Medcan interpellates its client-investors as “individuals interested in proactively managing their health and well-being” (Medcan).

The optics of the Medcan website and of HMOs in the U.S. closely resemble those of websites advertising elite gyms and spas, where the act of attaining membership status is understood to offer the consumer enhanced health. The very fact of belonging to an organization that works to maintain health gives the health investor a sense of having taken preventative action. Adele Clarke et al. (2010) put forth the concept of biomedicalization to theorize the ways in which medicine, the life sciences industry, and neoliberal capitalism and its culture of technoscience have produced a new paradigm through which moral imperatives towards health are articulated to specific interests. These interests are understood as universal, thus furthering social stratification through modalities of race, class and gender. In the era of biomedicalization, health is increasingly understood as “a matter of ongoing moral self-transformation” and “something to work toward” (Clarke et al. 2010: 63). In this model, medical intervention is not merely responsive to illness once it becomes manifest. The health investor is expected to seek medical intervention before it is required in order to prevent a more severe intervention later.

This transfer of responsibility to the individual—targeting the individual's morality and capacity for self-management—works through the health insurance industry's discursive shift to a pre-emptive logic. As Clarke et al. argue, "[t]erms such as 'health maintenance,' 'health promotion,' and 'healthy living' highlight the mandate for work and attention toward attaining and maintaining health" (2010: 63). The health investor internalizes this moral imperative towards self-improvement and self-regulation, working to maximize health through a variety of enhancement strategies. The idea that we are in control of our health only fuels blame culture, where "the focus is no longer on illness, disability, and disease as matters of fate but on health as a matter of ongoing moral self-transformation" (Ibid). A logical consequence of the acceptance of this paradigm is that health begins to be understood as reflective of an individual's character, prudence as an investor, willingness to work hard and behave proactively.

The legal scholar Lori Andrews (2001) and sociologists Stefan Timmermans and Mara Buchbinder (2010), among others, describe contemporary biomedicine's shift toward a future orientation in which the prospect of health or disease in the future is considered more urgent than present problems. They have argued that genetic testing has created problems in order to justify its existence, as genetic testing companies "cash in on the glamour of genetics, creating new psychological needs and then meeting them" (Andrews 2001: 9). Speculative medicine institutionalizes and reproduces the affective state of anticipation as "a lived condition or orientation" that "gives speculation the authority to act in the present" (Adams, Murphy and Clarke 2009: 249). This tendency is more pronounced in the U.S., where patients are prescribed preventative chemotherapy, mastectomies and hysterectomies to ward off forms of cancer forecasted by genetic testing. This phenomenon of undergoing medical treatment for potential future health problems has recently been chronicled in a memoir written by Amy Boesky, an English professor at Boston College. *What We Have* (2010) foregrounds this shift to future health and its ramifications for a family diagnosed as high risk for an aggressive form of ovarian cancer that occurs early in life. Boesky and her sisters struggle over whether to undergo preventative surgery to remove their ovaries in their 30s, grappling with a new form of subjectivity in which survival is pronounced *prior* to the onset of disease. This new subject position of "previvor" is employed by several patient advocacy organizations, including the organization Facing Our Risk of Cancer Empowered (FORCE). A patient advocate coined the term "previvor" in 2000, after patients undergoing preventative surgery began to call for a label (Nye 105). This was an effort to create a meaningful category through which to lobby for support for this new state of medical subjectivity. The subject position of "survivor" has proved successful for the work of other patient advocacy groups. The prefix "pre" provoked controversy amongst science studies scholars, who have argued that this prefix's association with preparedness, being proactive and planning ahead implies that individuals who are *not* able to prevent diagnoses of cancer are at fault in preventing the onset of disease because they are passive or lack vigilance.

Indeed, the ability to obtain genetic testing and preventative medicine is only available to some. The geneticization of health can turn attention away from consideration of the social, political, economic and environmental determinants of health, where elevated rates of disease often follow the same lines as other societal divisions. Structural inequalities produce varying abilities to respond to the "moral economy" of speculative medicine. As Coleman Nye writes in a recent article on previval and preventative oncology, "the practice of previval is premised on the capacity for investing in futurity" (2012: 114) and this treatment choice is rarely offered to individuals who live paycheque-to-paycheque. Nye's study suggests that "previvors" in the U.S. are predominately upper-middle class, white, highly educated, healthy possessors of comprehensive health insurance (2012: 113). More studies are needed of the stratification of preventative health care, especially ones that explore how marginalized groups are prevented from accessing the benefits of new medical technologies.

Speculative Medicine

> We must free ourselves from the medical mystification which confines us to seeing medical care as something wholly ordained by technology—a "commodity" whose social structure cannot be examined because it is believed to have none. (Ehrenreich and Ehrenreich 1974: 24)

What normative work does the concept of health do? What does it mean to value health and to work towards a "healthy future?" Roy Romanow's endorsement of the 2010 edited volume *Redistributing Health: New Directions in Population Health Research in Canada* offers the following praise: "This important book helps point the way forward to a more equitable and healthier future" (qtd. in McIntosh 2010: cover). Is Romanow gesturing towards a future in which health will be equitably distributed? As I have shown, health is now understood as a metric of access and dedication to practices of personal risk-management, and thus a more equitable distribution of health becomes a less desirable goal because distributing "health" also distributes blame and moral judgment.

How can we assess the political work done by the shift away from attention to present structural inequities and toward atomized projected futures? Adams, Murphy and Clarke theorize "anticipation" as the affective state through which projected futures shape the present. They argue that “anticipation now names a particular self-evident ‘futurism’ in which our ‘presents’ are necessarily understood as contingent upon an ever-changing astral future that may or may not be known for certain, but still must be acted on nonetheless” (2009: 247).

The science of genomics has also transformed the proper site of investment to include the molecular as a set of risks, uncertainties and contingencies to be managed. Kaushik Sunder Rajan points to the reliance of genomics on the language of speculative capitalism, arguing that “the sorts of knowledge genomics provides allows us to *grammatically* conceive of life” displaced to “a future tense,” such that investment in drug development and “risk management” is made to seem “natural” (2006: 14). Sunder Rajan characterizes genomics as a form of what Joseph Dumit calls “venture science”: a science that was co-produced with venture capitalism and therefore retains some of its traits. For Sunder Rajan, it is the promissory logic of genomics and its temporal shift towards future risk that cements its place as “part of the discursive apparatus of contemporary capitalism” (2006: 136). Genomics instantiates a “new grammar” that “sees life as something that can be invested in” (Ibid). As “an assemblage that is an implosion of the corporate and the scientific,” personalized medicine retains the paradigm of “life as a business model” (137, 168). Genotypes are evaluated for their future value and risks are managed in the same way that financial derivatives are calculated. The science of statistics is central to the process through which risks are measured and treatments developed: “Subjects get constituted through genetically determined probability statements simultaneous to their constitution as future probable targets of individual therapeutic intervention” (169). The assumption is that the environmental and social of determinants of health affect all segments of the population equally, and that access to preventative health care, uncontaminated water and fresh vegetables is not highly striated by class, the uneven distribution of wealth and systemic racism.

Melinda Cooper (2008) follows the shift to a new form of biopolitics as the calculated management of the productive capacities of molecular forms of life, which followed the revolution in the life sciences industry. Cooper argues that this shift in medical discourse must be theorized alongside the transition to finance capital because the intangible, abstract character of the molecular object of exploitation in biocapital belongs to the speculative phase of capital (Cooper 2008). Fredric Jameson has shown that finance capital designates the shift from production to speculation following the depletion of non-renewable natural resources and the end of their productive moment (1993). Frantically searching for new objects of exploitation, capital reimagines itself in a "higher," more abstract and intangible form through the "promissory" investment, as is exemplified by the personalized medicine industry.

This is the "bio" that informs the concept of "biocapital," which designates capitalism's shift in object of exploitation from "whole" human labour power to molecular labour power through industrial forms of production, as well as and the shift to speculative capitalism where profit is generated without production by investment in "promised futures." Eugene Thacker shows that through the metaphor of genes-as-information, the molecular is imagined to be *essentially* productive (2005). This idea shifts the emphasis in biotech production from exploitation to the mere re-direction of an already existing productive resource. As Cooper (2008) argues, biocapitalism is thus named not only because the object of its exploitation is molecular, but because it was designed to possess the biological character of an endless capacity for reproduction.

A great deal of media emphasis gets placed on genetic questions, through which the figure of the "optimized individual" is constructed. In this paradigm, health requires the management or processing of information. Owing to the speculative nature of these sciences, the genetic paradigm enacts a sort of temporal displacement in that our attention to today's social problems gets diverted to the distant future. The *idea* of these future problems occupies the space of today's crises, displacing urgent problems such as environmental contamination and other "low tech," non-speculative structural inequities. These concerns do not attract the same corporate funding as genetics and pharmacogenomics research.

Colonial Medicine

> An individualist culture finds ways of making its disadvantaged members disappear from sight. (Mary Douglas 1992: 36)

I now turn to an analysis of public health campaigns directed towards Indigenous communities in Canada. In this context, the dominant narrative of genetic causation is turned on its head. American models of financialized medicine have increased their influence on Canadian health policy and the funding of medical research. I trace the effects of this shift as it is expressed by two public Canadian research institutions: the first institution, a partnership between Genome Canada and the Canadian Institutes of Health Research's Genomics and Personalized Medicine Initiative, aims to develop "personalized medicine," to be implemented as a clinical practice on a national scale, and the second, the National Aboriginal Health Organization (NAHO), has taken a broader social approach in its work on improving the health of Indigenous people as subjects of colonialism. Throughout this discussion I want to emphasize that the Indigenous peoples in Canada have largely been excluded from the benefits of medical research while being affected disproportionately from several different categories of disease, the result of colonial policies and practices (Adelson 2005; Mosby 2013; Truth and Reconciliation Commission of Canada Report 2015).

Public health campaigns are an important mechanism through which asymmetric power relations produce what Lazzarato describes as the subjectivity of indebtedness particular to finance capitalism (2011). However, in the context of settler states such as Canada, the asymmetry of the creditor-debtor relationship is not uniform across striations of race, class, gender and other modalities of marginalization. In First Nations, Inuit, and Métis communities, a lack of resources and the critical absence of social services are not new: though they are worsened by contemporary austerity and privatization, they are part of a long history of colonialism.[96] In this analysis I follow the work of David Arnold, who argues in *Colonizing the Body* that biomedicine by its very nature colonizes *all* bodies, but that some bodies are more accessible than other bodies as a result of colonialism. It is important to show how neocolonial institutions and practices carried out in Canada today contribute to unevenness in the realm of health and medicine.

In January 2012, the Harper government announced an enormous increase in funding for the "personalized medicine" initiative. The government encouraged

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[96] The severity of the harm done to Indigenous practices of health and healing (and the passing of these traditions between generations) by colonial policies and forced assimilation cannot be overstated. While neoliberal medicine makes gestures towards the concept of holistic therapy through an increased attentiveness to environmental factors in the development of disease, such as nutrition, the neoliberal paradigm is epistemologically and pragmatically incompatible with Indigenous medicine. The social and material resources required by Indigenous healing practices—including robust Indigenous communities, languages, spirituality, continuity of culture, traditional knowledges, the land as source of food, water, and medicine, all of which are profoundly interconnected—have been systematically deteriorated through colonial practices (Lux 2001).

molecular biologists in Canada to align their research with the initiative in order to continue to receive funding, which is now distributed through Genome Canada, a public-private hybrid organization. In March 2012, the Harper government announced that it would cut all funding to NAHO, the only organization in Canada that collected information on demographics and disease in Indigenous communities.[97] As a result, this organization was forced to shut down as of June 30, 2012. This tremendous disparity in research funding produces a problematic cultural narrative concerning what is the "scientifically proven" locus of disease, as genetics research is privileged over research on the social and environmental determinants of health. This discursive strategy of privileging genetics research influences what is understood as disease and what is understood as social or cultural pathology. It has been well documented that several categories of disease occur with a higher frequency in Indigenous communities than in non-Indigenous communities in Canada (Teucher 2010; de Leeuw and Greenwood 2011). The striation in data about health quality on- and off-reserve is enormous. As de Leeuw and Greenwood write, "although Canada is ranked among the best places to live in the world, if the United Nations Human Development Index were applied to Indigenous people living on-reserve, Canada would rank between sixty-eighth to eightieth in the world" (2011: 63). In Canada, many health problems that are more common in Indigenous populations get worryingly "culturalized," thus absolving the government of responsibility for providing care. At

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[97] The Harper government announced the cutting of funding to NAHO as part of a broader plan to cut $200 million in Health Canada spending in 2012 (Picard 2012). Simon Brascoupé, CEO of NAHO at the time it was shut down, told CBC that the rationale NAHO was given by the government for its funding cut was that the government "was protecting the monies that go to regions, to First Nations and Inuit—direct services was being protected and funding for indirect services like ours was being cut" ("National Aboriginal Health Organization's funding cut," CBC, April 9, 2012). Needless to say, the "indirect services" directed towards funding research into how to prevent wealthy non-Indigenous Canadians from potential genetic disease saw their funding increase that same year.

the same time, other biological states are geneticized and marked for intervention. As a result, genomic profiling practices and mutation-targeted drugs are developed to treat relatively rare medical conditions while extremely high rates of treatable disease more common in Indigenous populations—these include tuberculosis[98] and diabetes—receive astonishingly scant medical attention.

Personalized medicine is viewed by many as a "promissory science": a concept takes form more substantially in the speculations and promises of its supporters than in empirical scientific results and marketable products. In light of the recent funding announcement in Canada and the accelerated efforts to develop pharmacogenetic therapies for clinical use, it is important to consider how promissory science is being imagined by the Harper government. Health policy in Canada swings inconsistently between the epigenetic and genetic paradigms of the human genome, in other words, between a paradigm that takes the social determinants of health into account and a paradigm that ignores the importance of structural inequities in the study of health. While increased funding for personalized medicine under the Harper government suggests an ideological alignment with the doctrine of genetic predetermination, the epigenetic paradigm is strategically invoked in public health campaigns directed towards First Nations, Inuit and Métis children. In the following pamphlets of environmental health information distributed to First Nations, Inuit and Métis children and youth by Health Canada, children are asked to spring into action to detoxify their living environments by scrubbing traces of lead from their homes. This campaign explicitly assigns responsibility to individuals in the sort of biopolitical

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[98] As of 2010, the rate of infection with tuberculosis was 31 times higher in Indigenous communities living on-reserve than among non-Indigenous Canadians, and the TB infection rate in Inuit communities was 185 times higher than in non-Inuit communities in Canada (Canada House of Commons Standing Committee on Health, 2010).

operation described by Foucault as “assur[ing] the self-financing by the poor themselves of the cost of their sickness and temporary or permanent incapacitation” (1980: 169).

Get the lead out!

Lead is a metal found naturally in the earth’s crust and can be added to certain products. There are many ways lead can get into your home - soil, pesticides, drinking water, paint and dust to name a few. Exposure to lead can make you feel sick.

The good news is there are things you can do! Take off your shoes, wash your hands, mop and dust floors, walls, ceilings, and window sills regularly.

Figure 9. Health Canada’s “An Environmental Health Activity Booklet for First Nations Kids” (2011).

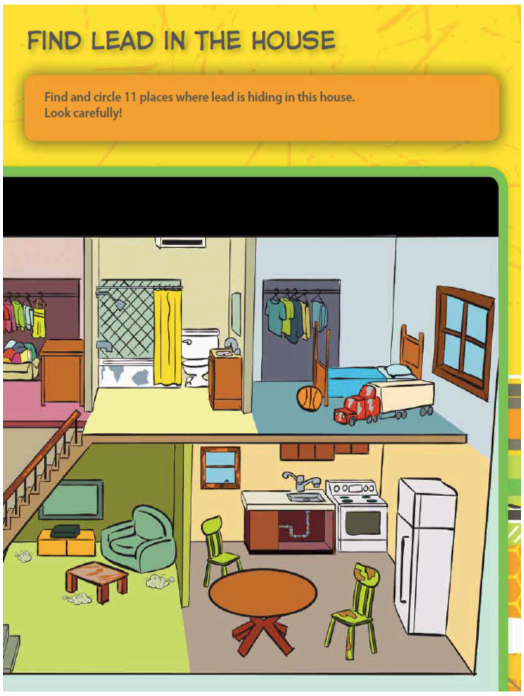
LEAD

get the lead out!

Lead is a metal found naturally in the earth's crust and can be added to certain products. There are many ways lead can get into your home – from the soil on the bottom of your shoes, from your drinking water, old paint and dust to name a few. Exposure to lead can make you feel sick.

Luckily the effects from lead exposure are preventable, so make sure you do as much as possible to keep lead out of your house. Take off your shoes, wash your hands and mop and dust floors, walls, ceilings, window sills regularly.

Figure 10. Health Canada's "Live, Play, and Learn! An Environmental Health Activity Booklet for First Nations Teens" (2011).



FIND LEAD IN THE HOUSE

Find and circle 11 places where lead is hiding in this house. Look carefully!

Figure 11. Health Canada's "Live, Play, and Learn! An Environmental Health Activity Booklet for First Nations Teens" (2011).

Aside from the neoliberal injunction to "pull yourselves up by your bootstraps!" implied by the colloquial "get the lead out!" and its reference to "hard work" as a prerequisite for economic wealth, this campaign is symptomatic of the insidious and systemic ways the governmental devaluation of Indigenous lives is articulated through policy. While these pamphlets do not explicitly blame people living on reserves for the environmental contamination of these spaces, this campaign aggressively effaces blame from corporate neocolonialism and its resource-extracting activities—as well as chronic forms of governmental violence and neglect—that *are* responsible for the lead contamination. The exposure to toxic contaminants is inextricable from the colonial context of the reserve homes represented in these pamphlets, where by-products of industrial resource extraction compromise food, water and housing infrastructures at these sites of extraction long after industry has left, taking the profits with them.

Mimicking the design of comic books and graphic novels imagined to appeal to the target ages of children and teenagers, the pages of Health Canada's "Environmental Health Activity Booklets" predominantly feature a cheerful yellow colour that distracts from the dire textual content of the pamphlets. The images illustrating the pamphlets include photographs of First Nations children diligently and responsibly practicing personal hygiene and dusting their homes to prevent lead poisoning. The pamphlet designed for First Nations teenagers too casually notes that "[e]xposure to lead can make you feel sick. Luckily the effects from lead exposure are preventable, so make sure you do as much as possible to keep lead out of your house" ("Live, Play, and Learn! An Environmental Health Activity Booklet for First Nations Teens"). Another page in the booklet invites teenagers to hone their lead-identification skills by circling the places where lead might appear in the home; the pamphlet represents lead as accumulating in surprisingly visible masses found on kitchen chairs, underneath tables, adorning a child's toy truck, and on the side of the bathtub. This representation oversimplifies a complex and systemic phenomenon, rendering it both acute and preventable, rather than acknowledging its chronicity and inevitability under current on-reserve living conditions for many First Nations communities. The style of these pamphlets—and the fact that they are designed for children and teenagers rather than adults—was likely decided upon by Health Canada policymakers for a number of reasons, which I characterize as racist assumptions and blind spots. The irreverent style of the pamphlets normalizes and naturalizes the presence of lead in Indigenous homes, and the effort to pass them off as a game for children was probably thought to minimize the possibility for community panic at the acknowledgment of the presence of lead contamination inside homes, as well as the acknowledgment that the lurking masses of lead are dangerous and must be removed. The pamphlets are designed to inspire children to "take the initiative" and tackle the problem themselves, actively obscuring the epistemic space through which other questions might be asked, and resistances formed.[99]

The fact that these campaigns are designed to be "ethnically-specific" betrays the government assumption of a form of cultural pathology through which communities subject themselves to environmental harm, as though the communities themselves willed the persistent contamination into existence. The publication and circulation of these pamphlets also effaces the historical and present context of colonialism, which includes genocide, the seizure of Indigenous land and resources,

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[99] I thank Mark Simpson for helping me think through questions of agency, blame, and naturalization in my reading of the "Live, Play, and Learn" campaign.

and forced cultural “assimilation” and abuse through residential schools.[100] In prescribing a set of hygienic behaviours rather than even gesturing toward the sort of structural change that could reverse differential rates of disease, we see an extension of the same calculus that resulted in the *Zong* murders: first, in the assignment of an abstract, speculative value based on typology; and second, through the production of a moral order in which inequalities are naturalized. Though the existence of these pamphlets acknowledges that contaminated environments are a crucial determinant of health, the suggestion that children and individual families should remedy such a systemic and deeply rooted problem of colonialism can be seen as a form of victim-blaming enabled by misrepresentations of epigenetic science. Public health campaigns designed by Health Canada as iterations of colonial epidemiology, and directed specifically to First Nations, Inuit and Métis communities, can be understood as one of the more “subtle” colonial practices described by Taiaiake Alfred and Jeff Corntassel as:

> a form of post-modern imperialism in which domination is still the Settler imperative but where colonizers have designed and practice more subtle means (in contrast to the earlier forms of missionary and militaristic colonial enterprises) of accomplishing their objectives. (2005: 597-598)

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[100] While the Canadian government attempted to justify its establishment of residential schools by arguing that the institutions would enhance Indigenous health through the teaching of proper hygienic techniques, thereby lowering rates of disease, it has been well documented that disease flourished in these schools. Disease spread rapidly and uncontrollably, just as other epidemics had since the Europeans’ arrival in Indigenous territories centuries earlier. For more on residential schools and Indigenous health, see Kelm (1999), Lux (2001), Milloy (1999), Mosby (2013), and the Final Report of the Truth and Reconciliation Commission of Canada (2015).

While critical analyses of government policy are necessarily hampered by the enigmatic nature of policy development, and the barriers restricting access to information concerning the considerations behind the development of any particular policy, we can still read a core set of assumptions as expressed by policy, and extrapolate from there. In the case of Health Canada's "Live, Play, and Learn!" campaign, the particular form of the campaign—a comic pamphlet distributed through public health channels—is likely at least partially informed by budget considerations. Pamphlets are cheap to produce, especially when distributed online and through already-established infrastructure such as health clinics. Another consideration for Health Canada policymakers might have been a government priority to improve the health of First Nations, Inuit and Métis children. But how can this campaign be understood to provide means through which children's health might be improved? The logic of this campaign certainly lies within the mandate of Health Canada—"Helping Canadians to help themselves" (Health Canada)—and is thoroughly neoliberal in its assignment of responsibility to the afflicted children and teenagers, together with insincere motivation expressed by a "can-do attitude" in lieu of resources that could alter the living conditions that produce most of the diseases that affect First Nations, Inuit and Métis children.

In contrast to the disavowed colonial stance implicit in Health Canada's "Live, Play, and Learn!" campaign, other federal government funding programs—such as the Canadian Institutes of Health Research (CIHR) "Pathways to Health Equity for Aboriginal Peoples" initiative—explicitly acknowledge colonialism as a cause of higher rates of disease and poorer overall health outcomes in Indigenous communities in Canada. Is this a contradiction? How can two branches of the federal government offer narratives of causation concerning higher rates of illness in First

Nations, Inuit and Métis communities that so blatantly contradict one another? This is not necessarily a contradiction, but instead a productive opposition that speaks to a lack of coherent social policy in this federal government. Further, the very fact of the lack of coherent policy is typical of colonial and post-colonial rule, and speaks to a high degree of internal discord concerning the valuation of and distribution of resources to Indigenous communities in Canada. CIHR's "Pathways to Health Equity for Aboriginal Peoples" website explicitly indicts colonialism as cause of disease, while also being careful to frame scientific knowledge about causation as a potentially emancipatory tool. The brief overview the website provides dramatically parts ways with the epistemology expressed by the Health Canada's "Live, Play, and Learn!" campaign, and, surprisingly, echoes some of the arguments made in this thesis:

> The root causes of poor health are well understood. Factors such as income, education, employment, living conditions, social class, social support, and access to health services are all part of determining whether or not people are healthy. Aboriginal peoples' health is also affected by culture loss, racism and stigmatization, loss of language and connection to the land, environmental deprivation, and feeling spiritually, emotionally, and mentally disconnected from their Indigenous identity. Being disconnected from their Indigenous identity can damage Aboriginal peoples' health. ("Pathways to Health Equity for Aboriginal Peoples: Overview")

Despite the good intentions on the part of policymakers that likely resulted in the approval of this damning narrative of causation—including the explicit indictment of Indian Residential Schools as cause of disease and overall poorer health—the

"Pathways" initiative quickly turns to a colonial practice of pathologizing particular behaviours as mechanism of causation. The website goes on to state that the fourth priority area of the "Pathways" initiative is oral health—and the reader is once again encouraged to categorize Indigenous health as a problem of hygiene. Despite its promising opening lines, suggesting the possibility of an alternative narrative, the "Pathways" initiative does not make a significant departure from Health Canada's "Live, Play, and Learn!" campaign in its content. CIHR's initiative cannot be redeemed by the presence of its acknowledgment of the health effects of colonialism.

The presence of these sentences recognizing the ongoing harm caused by persistent colonialism, while encouraging, cannot negate the fact that CIHR's funded initiatives will produce results on the ground—in the form of public health campaigns, partially—that perpetuate rather than diminish the forms of inequality that cause these discrepancies in disease in the first place. It is important to frame these policy decisions as embodiments of a persistent governmental devaluation of Indigenous lives, rather than as a logical amendment to policy for a population with a different set of needs. The latter formulation is consistently put forth by the government as a form of legitimation of the government's calculation of negative biovalue in Indigenous communities, and, subsequently, the government's attempt to "cut their losses" while investing elsewhere. While genetic medicine bolstered by the ever-expanding production of genomic data is the type of medical intervention that the federal government sees as *correct* and *most promising* for its citizens today[101], poor health in Indigenous communities continues to be addressed as a problem of hygiene. This split—that there has been no proposal to extend genetic medicine, understood by the government as most progressive and possessing most capacity to

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[101] As evidenced by the federal government's funding of Genome Canada. For more on this, please see Footnote 106.

lower rates of disease, to Indigenous communities—speaks to persistent colonialism at work in the government, and the deep entrenchment of legal and policy mechanisms through which Indigenous lives are continuously devalued.

Health Canada's decision to produce a public health campaign identifying an industrial contaminant such as lead as agentic figure in the production of ill health naturalizes the frequency of illness in Indigenous communities as the contaminant is figured as 'external invader' beyond the control of, and certainly not produced by, government policy. This focus on this chemical element as agent of harm further obscures knowledge of the structural role played by colonialism in producing social and environmental determinants of health that produce higher rates of illness in racialized communities. But how can a chemical element such as lead be so convincingly configured as possessing the sort of agency that is usually understood as proper to humans and larger institutional structures driven by human will? In *Animacies: Biopolitics, Racial Mattering, and Queer Affect*, Mel Y. Chen theorizes how an ostensibly inanimate object such as lead can be ascribed a sort of agency, or animacy, through a focus on the interactions at the borders between inanimate matter of all kinds and the vulnerable, porous boundary of human skin where it meets these materials. In her analysis of the moral panic that took hold in the United States in 2007 concerning the presence of lead in children's toys manufactured in China, Chen interrogates the logics and assumptions underlying a moral panic bolstered by so little evidence[102] of physical harm done by products containing trace elements of lead. Chen argues that discourses around industrial lead have been racialized in the United States; first, associated with a particularly pathologized form of poverty ascribed to

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[102] This "paucity of evidence" is not unusual in the case of a moral panic, though—the emergence of such a panic in the absence of accompanying evidence of threat or harm is of course the very definition of a moral panic.

African-American communities, and then, in 2007, to a threateningly lackadaisical attitude towards environmental harm and toxic substances ascribed not only to the Chinese manufacturing industry, but to Chinese people themselves (163-166). Curiously, this moral panic operates around a threatening entity that never takes material or visual form. In her discussion of the media's role in implanting the moral panic, Chen writes: "While notions of lead circulated prolifically, lead itself was missing from these renderings. Neither the molecular structure of lead, nor its naturally occurring colors, not its appearance in raw form or industrial bulk were illustrated" (164). As in Chen's case, it is also crucial for the rhetorical aims of the Canadian public health campaigns that the lead threat is never given material form. Indeed, lead's absent presence, or, more specifically, the idea that lead (and other toxins) could be lurking everywhere, including our most comfortable and intimate spaces of dwelling—in our homes, in the paint on our walls—and that it is impossible to identify exactly where these toxic substances are lurking so that they can be safely removed, that produces the moral panic leaving us desperate for articulations of scientifically *certain* demarcations between 'safe' and 'unsafe' environments.

Chen's analysis of the 2007 moral panic also illuminates another aspect of the Canadian government's ascription of blame for environmental contamination of First Nations treaty lands. As Chen notes, the pollution and toxic industrial contamination plaguing Chinese land is rhetorically constructed as not only the fault, but even the free choice of the Chinese people, as though Chinese communities had any say in the transformation of their primarily agrarian communities into lands of extraction of labour and production of consumer goods for global capitalism (164-165). Just as China became a coveted site for global capitalism because the Chinese government rendered it a source of cheap labour and production, and thus contaminable, Indigenous land has been a valuable site for industrial capitalism in Canada because the political cost of contaminating Indigenous land has been known to be less than that paid by the contamination of land primarily inhabited by non-Indigenous people (though, unlike China, Indigenous land in Canada is valued for its rich natural resources rather than for cheap labour[103]). In both cases, though, the people inhabiting these lands during and after they have serves as sites of industrial production are rhetorically constructed as agents of destruction, whose individual actions are seen to have produced the pervasive forms of contamination that follow industry's productive moment.

It is within this context of a broader strategic narrative that both obscures the extent to which post-industrial sites are contaminated, and when recognized, absolves governments of responsibility, that I locate institutions such as Health Canada. This chapter's analysis of public health campaigns aims to render the stakes of such obfuscation legible.

While the Canadian health care system is praised and admired internationally for its public funding model, health care in Canada has never been universally accessible. This unevenness is exacerbated by policy and legislation changes at the federal and provincial levels. Funding for medical research and health care delivery is characterized by a conceptual striation because criteria for "health" vary depending on social class and racialization. For Canada's ruling class—largely white, upper-middle class and urban—health is characterized as personal, genetic and preventable. For the on-reserve First Nations, Inuit and Métis communities that Health Canada

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[103] Though, as Ian Mosby's article points out, the Canadian federal government's establishment of Indian Residential Schools provided the state with unpaid labourers in the form of Indigenous children, whose unacknowledged work created the conditions of possibility—for example—for the production of scientific knowledge, medical applications of this knowledge, and the development of profitable products such as Pablum, in the mid-twentieth century.

attempts to *manage* through its public health campaigns, health is constructed as environmental and cultural. In the latter context, the influence of environmental determinants of health is narrated in ways that absolve the state of responsibility for its role in creating environments that can cause disease, whether through industry, resource extraction, neglect or lack of funding. This form of epidemiological management continues Canada's work of settler colonialism, described by Sarah de Leeuw and Margo Greenwood as a project of "categorizing, or socially engineering, groups of people for the purpose of management" (2011: 63).

In her recent work on the afterlives of industry in communities, Michelle Murphy draws attention to what she calls "chemical infrastructures" as:

> the spatial and temporal distributions of industrially produced chemicals as they are produced, consumed, become mobile in the atmosphere, settle into landscapes, travel in waterways, leach from commodities, are regulated (or not) by states, monitored by experts, engineered by industries, absorbed by bodies, metabolized physiologically, bio-accumulate in food chains, break down over time or persist. (Murphy 2013: 105)

Murphy describes the multiple pathways followed by contaminants, both physical and epistemic, as they continue to wreak havoc long after their value has been extracted. This is the complicated picture that speculative medicine pushes aside in favour of a simple, causal logic that is better suited to risk management. Even speculative medicine invents itself anew in the context of colonialism. Industrial and resource extraction sites are frequently located in or near Indigenous communities, where the effects of toxins on health are visible and acknowledged as a partial cause of elevated disease rates. Despite this acknowledgement, there are other ideologies at work in the conceptual striation of future health: for example, Health Canada identifies sites of intervention in First Nations, Inuit and Métis communities differently than it does in non-Indigenous communities. As a colonial apparatus, public health campaigns directed towards First Nations, Inuit and Métis communities blame the victim by indicting children for the presence of contaminants in their living spaces, while simultaneously projecting a different future for these communities. By identifying hygiene—including the act of removing lead from homes—as the proper site of health intervention, these public health campaigns undermine Indigenous self-governance, and traditional knowledges and practices, reinforcing racist ideologies developed by the colonizers to justify their continued acts of marginalization.

The funding of personalized medicine in Canada presently functions as a discursive operation that restricts understandings of the aetiologies of disease to a narrow genetic framework, ossifying important work on social and environmental determinants of health, and creating an epistemic space for victim-blaming, validated by genetic determinism. The processes through which health is being financialized work to shut down our understanding of the complicated relationships between environmental pollutants, access to food, water, medical care and uncontaminated living spaces, and patterns of gene expression, restricting these interactions to a causal narrative that is far too simple. As a way to create space for different questions and knowledges, the Canadian government would do well to foreground social and environmental context in its research funding and health legislation, prioritizing research influenced by an understanding of epigenetics as a metric that can render the intergenerational harms inflicted by colonialism legible in their expression as health disparities. Recent research in epigenetics has shown that our "genetic destinies" are much more malleable and environmentally contingent than once believed. The epigenetic paradigm radically overturns genetic determinism, directing our attention to the ways in which changes in patterns of gene expression routinely appear within a single lifespan in response to environmental and social determinants of health.

Conclusion: “Genomic Sovereignty, Indigenous Epistemologies, and Epigenetics”

> Canada is a test case for a grand notion—the notion that dissimilar peoples can share lands, resources, power and dreams while respecting and sustaining their differences. (Royal Commission on Aboriginal Peoples Final Report, 1996: ix)

> Reconciliation must create a more equitable and inclusive society by closing the gaps in social, health, and economic outcomes that exist between Aboriginal and non-Aboriginal Canadians… For governments, building a respectful relationship involves dismantling a centuries-old political and bureaucratic culture in which, all too often, policies and programs are still based on failed notions of assimilation. (Truth and Reconciliation Commission of Canada Final Report, 2015: 125-126).

This thesis critically evaluates the politics of public health, genomic medicine, and health disparities’ relation to racial and social forms of inequality in North America through a focus on institutional sites of knowledge production surrounding disease causation. I have situated this intervention as an attempt to interrupt a long history in which rhetoric of causation as been marshalled as a form of governance that has—through policy and other indirect mechanisms—devalued Indigenous lives in Canada. I have traced the role that science and medicine have played in legitimizing government devaluation through an insistence on biological variation as causal mechanism of inequality. This argument—that higher rates of disease in Indigenous communities in Canada are caused by biological difference and increased susceptibility rather than by the effects of colonialism on health over generations as well as present day policies that perpetuate living conditions and resource inequalities that cause disease—has attained a status of epistemic dominance and is propped up by a reductive notion of causation that is consonant with other concepts of causation central to neoliberal discourses concerning poverty, as well as the political ideology that underlies the funding of genomic medicine in Canada.

The Canadian government's establishment of Genome Canada in 2000[104], a lavishly-funded set of research institutes devoted to the study of genomic sequence as causal factor in the development of disease, betrays the Conservative government's ideological investment in hereditary causation.[105] As I argued in Chapter Three, the funding of genomic research in Canada has increasingly come at the cost of—or has at least has coincided with—the cutting of funding for research on the social and environmental determinants of health, including institutions that have served important public health functions, such as NAHO. National institutions for genomic research like Genome Canada play another role apart from producing knowledge concerning the causation of disease, though. While this function has been downplayed in the Canadian context, genomics institutes are highly valued for their potential in producing knowledge concerning the "racial constitution" or geographical origins of that country's citizens. For instance, genomics researchers in Australia working to produce knowledge of Aboriginal Australians' geographical origins have expressed the envy they feel towards the support provided to genomics researchers in Canada in the form of Genome Canada.[106]

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[104] Uncoincidentally, the same year the first "rough draft" of the complete sequencing of the human genome was completed by the Human Genome Project, shortly before the HGP's completion in 2003. The socio-political context into which Genome Canada emerged was also a context that was increasingly leaning towards a "post-racial society." Incidentally, Paul Gilroy's *Against Race* was published in 2000.

[105] The Canadian government's investment in genomics research continues to grow. On March 31, 2015, further spending of $15.5 million "to jump-start the creation of…an 'innovation network'" in the form of ten research centres, in lieu of the five research centres that have hitherto comprised Genome Canada (Semeniuk). While this investment is actually relatively small in the context of genomics research and expensive sequencing machines and bioinformatics equipment, Semeniuk reports that the government funds will be matched by "other public and private sources…bring[ing] the initial investment in the network to $31 million" (Semeniuk).

[106] Personal conversation with Dr. Emma Kowal, Deputy Director of the National Centre for Indigenous Genomics at the Australian National University, in April 2014.

National Genome as Resource: The Intersection of Nation and Biological Ideas of Race

The concept of "genomic sovereignty" (GS) was proposed as an intervention in the global race towards population genome sequencing; GS was put forth as a space from within which claims to equality could be made. Conceptualized as a mechanism through which to equitably distribute the value that national genomic data could fetch on an international pharmaceutical market eager to use national data to produce innovative pharmaceutical products, GS would theoretically return this value to disadvantaged communities of a national population as part of the agreement governing these communities' participation in genomic research.

As Ernesto Schwartz-Marin and Eduardo Restrepo chronicle in their article "Biocoloniality, Governance, and the Protection of 'Genetic Identities' in Mexico and Columbia," the concept of genomic sovereignty was first developed by the Mexican Institute of Genomic Medicine's (INMEGEN) Ethical, Legal, and Social Issues Centre in 2004 (shortly after the HGP was completed and at the height of the race to sequence "rare" genomes around the world). Genomic sovereignty was conceptualized as a strategic method that could be adopted by nations lacking power and capital through which to protect themselves on the global stage, as well as nations with vulnerable—and genetically "rare" and thus highly-sought-after genetic material—populations to protect. As Schwartz-Marin and Restrepo write, "genomic sovereignty fueled a national law of health to protect 'The Mexican Genome' from 'unscrupulous capitalist interests'" (996). GS was designed to protect national populations from the sort of genomic plunder that took place in Iceland when its government sold its citizens' genomic data for profit to the pharmaceutical industry. The terrible precedent set by the Icelandic experience haunted Mexican policymakers.

A paradigmatic case of biocolonialism, the genomic researchers at deCode Iceland mobilized the ethic of universal "open source" and the global sharing of information to persuade Icelanders to contribute their genomic material. When deCode sold Iceland's genomic information for pharmaceutical development, the promise of sharing and openness was betrayed. Those who shared their biological materials for the public good in fact benefitted only private capital, as the Icelandic genomic information was patented and sold back to the Icelandic people in the form of (supposedly ethnically-tailored) medications.

The Mexican government wanted to avoid making the same appalling error in judgment made by the Icelandic government. In the Mexican context, GS allowed the government to (1) maintain control over the economic value of its genomic materials and the allotment of this value, and (2) to shape its own national image as multi-ethnic and rich with "rare genomes" in a climate in which these traits were of enormous economic value. The threat of American scientists bringing expensive sequencing machines to Mexico, analyzing the Mexican data, and then taking the valuable data back to the US was too great. Mexico wanted to sequence its own "raw data" itself and keep the profits.

As Schwartz-Marin and Restrepo recount, an important component of GS in the Mexican context was insuring that the principle of inclusion was carried out to the greatest possible extent. In this paradigm, genomics research held the potential for vastly improved health and the prevention of disease, though only on the condition that enough knowledge was produced about rare genomic "types" to allow to adequate medical therapies to be developed. For this reason, Amerindian and Mestizo Indigenous communities in Mexico were courted by INMEGEN scientists with the hope that the sequencing of Mexico's genome could be complete with its rare components. The scientists and the government policymakers were aware of the economic importance of including Indigenous groups in the sequencing of the "Mexican genome"; if they were left out, the national genome data would be worth much less to pharmaceutical investors. However, Indigenous research subjects were told a different story. The narrative offered to potential research subjects was that providing biological samples and taking part in the project would ensure that their interests were represented when the sequenced data was eventually used to produce medical therapies (and if samples were not provided, Indigenous communities would continue to suffer from medical therapies developed for populations that were genetically different, and thus not optimized for their own specific maladies). The genome project was justified on these grounds, through a promissory logic—that rare disease would become treatable and preventable—but in the end, the genomic data resulted in very little medically-relevant knowledge (Irma Silva-Zolezzi). Instead, the data collected from Mexicans was used for research on race, ethnicity, and migration history. In the context of the ongoing global Human Genomic Diversity Project (HGDP), Indigenous genomic data had become very valuable (Reardon).[107] The Mexican government recognized this, and, Schwartz-Marin and Restrepo argue, the government charged foreign scientists more to access Mexican genomic data on the basis of this increased value. According to Schwartz-Marin and Restrepo, GS in the Mexican context was unable to fulfill its promise of reversing power relations and instituting a postcolonial emancipatory mode of science that would equalize access to knowledge, medical treatment, and financial resources in a highly unequal country. It turned out that GS wasn't able to offer enough resistance to global flows of power

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[107] Indigenous genomic data is still highly sought after by genomics researchers today, which raises many questions in the Canadian context (still under-researched, with the notable exception of Amy Hinterberger's work on genomic research and official multiculturalism in Canada).

and resources. Instead, GS in Mexico worked to prop up the existing regime, reinforcing a system that extracts data from those who most need support and resources, to benefit those who already have more than enough.

The Politics of Genomic Genealogy Studies

This dissertation has interrogated the role played by land, history, and science in determining our understanding and treatment of human health and disease. One of the most crucial strands that has emerged from this study is the role of evidence (or the politics of evidence) in arbitrating truth from fiction, or what is considered as such, in realms as diverse as the criminal courtroom, the research lab, the hospital, Indigenous land claims, citizenship disputes, and economic reparations.[108] States and institutions governing the material outcomes of such struggles tend to rely on just one form of evidence as that which all parties seeking official recognition of their particular experience must appeal to. In the early twenty-first century, genetic evidence occupies this coveted position of cultural, political, and epistemological dominance.

One of the primary reasons for the epistemic dominance that genetic forms of evidence enjoy today is the ability of genetic material to act as incontrovertible legal evidence, often providing a form of "proof" that can sometimes fly in the face of usual flows of power. In criminal courtrooms, DNA evidence can provide a form of assurance that the innocent are acquitted and the guilty will be punished. But it is this desire to establish clearly demarcated camps of the innocent and the guilty that I have

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[108] It is in this context in which empirical data continues to reign supreme that the Final Report of the Truth and Reconciliation Commission of Canada provides such a sharp—and welcome—interruption to this protocol in the sense that the testimony of survivors has been granted equal legal standing as evidence alongside the forms of empirical evidence that are more often championed by North American legal culture.

argued can lead to such insidious forms of inequality, including the stratification of access to health care. What are the limits of the utility of DNA evidence? Can the set of epistemological assumptions upon which the functionality of DNA-as-evidence rests also do harm? How can a complete reliance on genetic evidence as one of Western culture's most trusted compasses in a quest for truth perpetuate forms of colonial domination?

Funding for the study of Ancient DNA (aDNA) is rapidly increasing in North America and Europe in 2015. This emerging field of Paleogenomics is justified by its practitioners by employing a reparative justice argument: genetic ancestry testing holds the potential to return to African-Americans the history they lost through slavery (Alondra Nelson 2015). What does "history" stand in for here? What are the material dimensions of this history? The provision of incontrovertible genetic evidence of geographic lineage is important for individual subjectivity, cultural belonging, economic reparations, as well as the calculation of health risks. In Germany, a new Max Planck Institute for the study of "the Science of Human History" (the *Max-Planck-Institut für Menschheitsgeschichte*) has been established in Jena (opened in 2014). This lavishly funded institute aims to produce evidence concerning the genetic history of all human communities, undertaking this history of human migration through a complete reliance on aDNA's truth-telling properties. One of the research projects to be carried out in this institute will extract aDNA from a collection of human remains originally collected by Nazi scientists from victims of the Holocaust. The question of whether human remains of people murdered by the Nazis should continue to be studied by scientists in Germany today is a matter of ongoing debate, but one of the arguments put forward by those who argue for aDNA research on human remains of Holocaust victims is that this research can provide an intact genealogy to the descendants and relatives of victims of the Holocaust—those who were robbed of their culture and their past by a political regime.

What possibilities does the prospect of Ancient DNA as evidence hold for Indigenous communities in Canada struggling to provide evidence for land claims in the context of a Conservative government whose tolerance for non-quantifiable evidence is low?[109] Does aDNA research hold the same sort of potential for Indigenous peoples whose histories and cultures have been all but destroyed by genocide, Residential Schools, and ongoing neocolonial policies and institutions in place today? Should First Nations councils turn to this sort of evidence as a temporary strategic measure? What sort of harm could be done to Indigenous ways of knowing by 'giving in' to this colonial epistemology? And further, what are the implications for the struggle to have the importance of the social determinants of health recognized if those whose health is significantly determined by deteriorating living conditions (in many cases) support the already-existing dominance of genetic evidence as source of truth?

Epistemic Dissonance

My argument follows those critiques of the concept of genomic sovereignty made by Schwartz-Marin, Restrepo, and Ruha Benjamin by pointing to the ways in

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[109] To cite one recent example of how the federal government of Canada—under the leadership of Stephen Harper—utterly disregards forms of knowledge that it sees as "non-quantifiable," including Indigenous knowledge: in September 2014, scientists employed by the Harper government located the sinking site of one of the "lost" ships from the Franklin expedition. Meanwhile, the Inuit have known the location of the ship for two centuries, but the Harper government opposes Indigenous knowledge to that of the Western science, and as a result, a great deal of government funding was devoted to producing empirical proof for an already-existing piece of knowledge. These government funds certainly could have been better spent elsewhere. Especially, as Michael Stewart suggests in his article "Harper's Franklin 'discovery'; Or, did anyone ask the Inuit?", the funds would have been better directed towards a federal government inquiry into Canada's missing and murdered Indigenous women.

which genomic sovereignty, rather than providing the grounds for autonomy and a more equitable distribution of resources and medical treatment, can exacerbate existing inequalities and increase communities' dependence on existing hubs of power, including neocolonial state apparatuses and private-public hybrid institutions that have a vested interest in producing distinctions between populations. As Ruha Benjamin writes, "the geneticization of national populations impacts groups differently, enriching some and dispossessing others, solidifying and weakening group ties to the nation-state in unexpected, and potentially detrimental, ways" (342). And Schwartz-Marin and Restrepo argue that genomic sovereignty's assumption that nation-states, communities, and groups can be defined and demarcated by a form of genetic homogeneity—in the name of protection—essentially operates a new form of colonial plundering, this time of genetic material, the genome as resource. When genetic material is framed as a community's most intimate possession, and the sole reliable marker denoting heritage, belonging, and even predicting collective and individual futures, this politico-scientific framing becomes tremendously difficult to dislodge from the collective imagination. It is the establishment of genomics as an Enlightenment project of truth-telling, and as producer of categorizable data that lends neatness to a messy and confusing world, that underlies the concept of genomic sovereignty. There are several openings through which I can envision the productive undermining of the concept of genomic sovereignty and the neocolonial harm it stands to bring about for Indigenous communities.

A tension exists between the genome—when framed as an epistemic object thought capable of producing an empirical sort of proof that can then bolster fledgling forms of sovereignty—and Indigenous epistemologies that reject such bald empirical logics and desires for neat, rational categories, as well as forms of sovereignty that mesh so well with settler state ideologies. Can the concept of genomic sovereignty travel beyond the Mexican context in which it emerged? How is it modified in different geographical, cultural, and economic contexts? The concept of genomic sovereignty is premised upon the assumption of a sort of universal objectivity possessed by DNA itself. To interrogate this further, I discuss cases in which the purported objectivity of the material basis for the genome is disputed by epistemologies that place value elsewhere—and, crucially, often in phenomena that resist empirical expression (or, non-quantifiable forms).

First, I examine the concept of the genome as it brushes up against Indigenous concepts of knowledge, identity, community, belonging, history, and autonomy. What are the stakes of genomic sovereignty's proposal to provide a sort of empirical proof for belonging through the sequencing of Indigenous cells? How can we reconcile histories and presents of exploitation and expropriation with the symbolic value produced by enclosure, protection, and the forging of coherence through genomic sovereignty for Indigenous communities? Any conversation about the human genome as object of knowledge and value is untenable for Indigenous communities in Canada because the concept of the genome is a construct of Western scientific methodology and cannot overcome its origins and retain its form. Genomics research can only produce meaning through quantitative, mechanized, evidence-based research—all of which are epistemological principles that run counter to Indigenous forms of knowledge. Further, genomic research does not meet the requirement that data produced from Indigenous communities be in the form of most usefulness and relevance to the communities themselves.

The Indigenous scholar Taiaiake Alfred argues that "'sovereignty' is an inappropriate objective for Indigenous peoples" ("Sovereignty" 464), maintaining that the very concept of sovereignty is premised upon a particularly European form of knowledge and of thinking, and that this concept cannot be 'tweaked' to serve Indigenous interests.[110] The very form of European/colonial knowledge that produced the concept of 'sovereignty' contains those power relations within it, so why, asks Alfred, would we imagine that the deployment of a set of practices informed by this concept in postcolonial settings today could possibly serve the interests of Indigenous people (465)? A set of processes through which Indigenous resources could be protected must be based instead on Indigenous principles, such as that of balance. Alfred writes: "A truly Indigenous system relies…on the dominant intellectual motif of balance, with little or no tension in the relationship between individual and the collective" (472). This notion of balance is not quantifiable in the sense required for the production of value in the context of capitalism and scientifico-political institutions that generate value on the basis of clearly demarcated markets in the form of population groups. As Alfred writes: "Indigenous conceptions, and the politics that flow from them, maintain in a real way the distinction between various political communities and contain an imperative of respect that precludes the need for homogenization" (472). Alfred looks to ways through which Indigenous people and allies can work against these state-mandated forms of valuation, stressing that the survival of Indigenous communities, land, and ecosystems depends on it.

Indigenous knowledge concerning the context within which genomic and other biological material function emphasizes the interconnectedness between human biological materials that are measured and "processed" by scientists to produce valuable information and these materials' environments, broadly construed. As Indigenous knowledge maintains, genes and genomic material cannot be made to

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[110] See also Jodi Byrd's forthcoming article critiquing sovereignty as paradigm.

mean separately from their context. New research in epigenetics reaches a similar conclusion: genetic material is constantly being shaped and altered by its environment, so removing it from its environment and using that decontextualized material to produce knowledge only provides a very limited picture of the dynamics between heritable and environmental elements in the body. In her research on Indigenous maize farmers in Mexico, Susana Carro-Ripalda has observed a different ontological relation between land and the people who live in the land. The two are ontologically inseparable, she notes. Human genes are not separable from human beings as a whole, and the humans are not separable from their land. When Indigenous communities make land claims, or claims to other resources or types of property, she argues, they are making a claim on a joint history. This concept of a joint history refers to the way that the land is quite literally a part of the human bodies that make up these communities, on a cellular level (and research in epigenetics backs this up, in case of any doubt). The maize is produced together through the development and care of both the humans and the land, and all three groups (the humans, the plants, and the land) contain constitutive parts of the other groups. In light of this insight, any form of sovereignty that is attached to a concept of a genomic material that is separable from its environmental context is untenable. As Carro-Ripalda notes, insights from Indigenous knowledge serve as stark reminders that the terms of the debate, and indeed the concepts through which power flows, are the concepts established by the scientists who approached genomic research with the goal of extracting as much data as possible from Indigenous communities. These concepts—genes, genomic material, property, value, and belonging—need to be assessed in relation to the politics of the milieu in which they were produced. Can engagements with these concepts produce any knowledge apart from that which benefits the previously-existing concentrations of power? What new possibilities might emerge if we build different frames and concepts through which to approach these questions?

Audra Simpson takes this further by arguing that it is "'membership talk'…[that] determines the conditions of belonging, the legitimacy of legal personhood outside of official or state law [in Indigenous communities]. Here the axis is in memory, in conversation, in sociality; by talking to other people you understand who someone is, how she is connected, and thus she is socially and affectively legitimized" (Simpson, *Mohawk Interruptus* 9). This is held in tension with the fact that "the right to determine the terms of legal belonging, a crucial component of sovereignty, has been dictated by a foreign government" (10). Concerning the disproportionately high number of missing and murdered women in Canada—a chronic disaster that the Harper government has tried to direct critical attention away from by calling it a "sociological phenomenon," Simpson offers a much more damning explanation. Governance and capital reproduction in and by the Canadian state, Simpson argues, requires the ongoing dispossession of Indigenous lands (Simpson 2014). This "sovereign death drive" produces the conditions of possibility for high rates of murder of Indigenous women—murders that are thinkable, largely uninvestigated, and unpunished in the settler colonial context only because Indigenous women operate as figures of an enduring Indigenous occupation of Indigenous land, thereby rendering these bodies disappear-able in the colonial mindset (Simpson 2014).

In considering the human genome as an object that could bear this value, and have a place within this notion of belonging, I look back to 20th century history of government medical experimentation carried out in Indigenous communities to show

how the very concept of the genome and the institutions and knowledge-producing bodies that endow it with symbolic and economic value remain untenable for many Indigenous communities today. The Canadian historian Ian Mosby's recent article, "Administering Colonial Science: Nutrition Research and Human Biomedical Experimentation in Aboriginal Communities and Residential Schools", brings to light new evidence of medical experiments that were carried out on Indigenous children in the context of colonial "Indian Residential Schools" in Canada. These residential schools were institutions operated by the federal government in collaboration with Christian churches for more than a century, between 1876-1996. Mosby's article received a great deal of attention in the popular media in Canada, provided archival evidence and support to the "Idle No More" social movement, and has incited much more public dialogue than academic research in the humanities usually generates.

In his article, Mosby pieces together the government documentation he was able to access from the Federal Archives in Ottawa to tell the story of a government-run nutrition study between 1942 and 1952 that involved at least 1300 unconsenting Indigenous research subjects living at Residential Schools located across Canada. Mosby was shocked to discover that the scientists and physicians who visited these Indigenous communities responded to the prevalence of malnutrition and starvation they found there *not* with calls for relief in the form of much-needed food supplies, but instead to preserve and prolong the sets of conditions that produced malnourished populations for the purposes of nutrition studies testing the efficacy of various vitamin and mineral supplements. They also tested newly developed products such as vitamin-enriched flour and baby cereal. Mosby also learned that these children were denied other medical services, such as fluoride treatments and dental care, that were standard at the time, even in residential schools, so as not to skew the studies' results.

The scientists “argued that, because cavities and gingivitis were both ‘important factors in assessing nutritional status’, dental interventions” such as filling cavities “would interfere with the results of the study” (Mosby 163).

The nutrition experiments were double-blind, randomized studies—so that children in the control groups of the studies were made to subsist in their hunger while other children in the experimental group saw their food servings triple in size (Mosby 160). For instance, in one study, children in the control group received 8 ounces of milk (less than half of the amount recommended by the Canada Food Guide at the time) per day, while children in the experimental group received 24 ounces of milk per day (Mosby 160).

In trying to comprehend how the nutrition scientists understood their role, Mosby suggests that many of the scientists and physicians were so profoundly ensconced in the colonial ideology that they justified using the children as research subjects through the assumption that there was no possible way for these children’s lives to improve anyway, whether they acted as research subjects or not, so it was thought that the best possible outcome could be produced through the gathering of data that would help other non-Indigenous children, such as those living in poverty in Canadian cities and afflicted with diseases like Rickets. As Mosby recounts, because the federal government was unwilling to increase the per capita funding formula at Residential Schools in the 1940s, “there was little likelihood that the students’ nutritional status would improve in any meaningful way,” thus providing nutritional scientists “an unprecedented scientific and professional opportunity” in the Residential schools as “a possible laboratory for studying human requirements for a range of nutrients as well as the effects of dietary interventions on a group of malnourished children” (Mosby 17).

When the scientists initially visited Indigenous communities to scope out possible research sites, many were shocked by the living conditions they found. One wrote: “while most of the people were going about trying to make a living, they were really sick enough to be in bed under treatment. If they were white people, they would be in bed demanding care and medical attention” (Mosby 3). The nutrition studies were pitched as an attempt to understand vast discrepancies in health between Indigenous and non-Indigenous communities in Canada, including an infant mortality rate 8 times higher, and a crude mortality rate five times higher in Indigenous communities than in Canada as a whole. Crucially, though, the studies were also legitimized as part of a broader civilizing mission that sought to assimilate Indigenous people and ultimately to transition them from “an economic burden” to an “economic asset” for the state. The scientists appealed to this criterion in their initial observation that the characteristics that had long been considered “inherent or hereditary traits in the Indian race” were actually the behavioural effects of malnutrition and vitamin deficiencies in communities suffering from hunger, and that these “troublesome behaviours” could be reversible.

As Laura Arbour and Doris Cook recount in their article chronicling the development of the concept of “DNA on Loan,” in the latter half of the twentieth centuries, as rates of treatable disease continued to climb in Indigenous communities, scientists developed an interest in conducting genetic studies of possible heritable forms of unique susceptibility to disease in these so-called “Indigenous isolate” populations. Scientists’ repurposing of Indigenous blood samples collected as part of an arthritis study in the 1980s for genetic ancestry research led to the development of new practices for researchers to follow when working with Indigenous communities, including cultural competency, community consent, and an epistemic shift in conceptualizing genetic material as continuously owned by the community and only temporarily "on loan" to scientists (Arbour and Cook 2006). It should not be surprising that scientists would look to genetic causation rather than social determinants of health in the context of a settler state like Canada, as the state has interests in absolving itself of responsibility for these higher incidence rates of disease. And locating the engine of causation in an entity that is supposedly impenetrable to social and political forces, as the genome has been understood to be, is an ideal way for the state to absolve itself of culpability.

Though the "DNA on loan" intervention was an important one, many feel it didn't go far enough in reforming scientists' practices in Indigenous communities, and, more importantly, that it works to prop up Western science without creating any space for Indigenous knowledge production. To find out more about the practices being proposed by Indigenous communities, I interviewed Melissa Carroll, the former executive director of TAASC (the Toronto Aboriginal Support Services Council), who works together with Julie Bull and Janet Smylie on the first Canadian Institute of Health Research-funded project that was developed by and is being carried out solely by Indigenous researchers and community members. This project, called "Our Health Counts," collects information on the social determinants of health for Indigenous people living in poverty, and is informed by Indigenous methodologies of trust, transparency, and storytelling, which also inform decisions made regarding ownership of the data produced by the study. Bull and Smylie are also writing a best practices handbook for use by white scientists working in Indigenous communities, with the aim of completely rewriting the way that Indigenous health is studied in Canada. Bull and Smylie's position on genomic research and genetic medicine is that genomic research is fundamentally incompatible with Indigenous methodologies because the way of producing knowledge in the genomic and post-genomic paradigm would necessarily transform both the materiality and meaning of the samples into a highly mobile and capitalizable form of data that runs counter to Indigenous ways of knowing, especially because Indigenous communities want to avoid supporting any mechanisms through which their data will benefit either the Canadian state or global capital.

Further, the guidelines that Bull and Smylie are writing will require non-Indigenous health researchers to spend months learning with and developing trust relationships with Indigenous communities, which will cause pragmatic problems for scientists to meet the dictates of existing funding structures. As one scientist said, “how do I tell the funding body that I have no research questions as of yet because I have to form bonds with the Indigenous community first, and formulate the research questions together with them, and this takes time.” In an attempt to create short-term solutions, co-learning initiatives such as Albert Marshall’s principle of “Two Eyed Seeing” attempt to bridge gaps while Canadian funding structures continue to privilege Western methodologies while leaving Indigenous-led projects nearly unfundable.

Going forward, I want to consider the possibilities held by an era in which the genome as epistemic object and fuel for economic and political value-generation *wanes* in importance. If the genome was thought to hold the key to the puzzle of human variation and disease causation, what, if anything, will emerge in its place that can carry such clout and produce such excesses of capital investment? I am (perhaps too optimistically) hopeful that new research in epigenetics on how living environments are altering gene expression means that living conditions, and social determinants of health more generally, suddenly become much more important for questions of scientific and medical research, state politics, and questions of sovereignty, and ultimately providing support for Indigenous-led studies on the social determinants of health.

The historian of science and sociologist Hannah Landecker is currently working on an ethnographic study of metabolic scientists, and is looking specifically at this question of how new research in metabolism in the post-genomic period is beginning to reveal an inversion of the model through which we have understood the role of the genome in the causation of disease since the 19th century. In a radical overturning of an epistemic context in which genetic determinism was once a dominant logic, epigenetic and metabolic science is now showing that the engine that determines the content and functionality of the genome (including susceptibility to disease) is not predetermined, but tremendously malleable and contingent upon environmental factors. As Landecker's research shows, the ongoing maintenance of an individual's genome *throughout* their lifetime through processes of metabolism—including the type of food eaten by the organism—can dramatically alter phenotype. The mechanism through which the genome is altered by food ingested is the genetic material contained within the food itself, which, until recently, was thought to be inert and not to leave any traces behind in the eater's body (Eichten et al.). Now studies have shown that the genetic material inside the food ingested interact with the eater's genome, resulting in changes to gene expression. This insight that nurture (or environment) is altering nature (which was thought of as inalterable) means that living conditions, and social determinants of health more generally, suddenly become much more important for questions of scientific and medical research, state politics, and questions of sovereignty. If poverty is shown to be inversely proportional to an individual's capacity for genome maintenance, and, thus, reduced rates of disease, then governments will be under increased pressure to implement measures to redistribute resources and improve living conditions for those most beset by disease. This is of course too optimistic a reading, though—for there are many different modalities through which Indigenous sovereignty is limited by the Canadian state.

In an era in which Western scientific forms of knowledge remain disproportionately influential, a scientific account such as this one is more likely to move governments to action. On the other hand, though, a rising to dominance of epigenetic science also opens up epistemic space for victim-blaming through highlighting how women's diets and psychological states during pregnancy can cause changes in gene expression within a single generation. This way, a mother can be blamed for her child's illness that is equally likely to be caused by the leaching of industrial chemicals into groundwater. It is possible, then, that epigenetics presents yet another epistemology that can be used as justification for individualizing blame and the elision of social factors such as unequal access to health care, housing, education, and nutrition in Indigenous communities, as well as unequal exposure to environmental contaminants, as determinants of health.

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