Genomic Citizenship: Peoplehood and State in Israel and Qatar

Genomic Citizenship: Peoplehood and State in Israel and Qatar

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Abstract

This dissertation describes basic genetic research and biobanking of ethnic populations in Israel and Qatar. I track how biomedical research on ethnic populations relates to the political, economic, legal, and historical context of the states; to global trends in genetic medicine; and to the politics of identity in the context of global biomedical research. I describe the ways biology is becoming a site for negotiating identity in ethnic genetics, in discourse over rights to citizenship, in rare disease genetics, and in personalized medicine. The core focus of this work is the way the molecular realm is an emergent site for articulations of ethnonational identities in the contemporary Middle East. This is thus a study of Middle Eastern ethnonationalism and state building through the lens of biology, specifically genetics and biobanking. In revealing the complex interdigitations of genomic technologies and articulations of ethnonational identity, this scholarship informs the biopolitics of the contemporary Middle East. I find that societal conditions (emerging national identities, immigration, demographic pressures, enskillment of citizens, biomedical capacity building, and globalization of the economy), and technological affordances (such advances in the speed and power of genomic sequencing technologies, and the entailed promises of biomedical progress), collide to overdetermine biological iterations of ethnic identity, and I show that biobanking projects serve, to varying degrees, to inculcate an imagination of shared history; a collective community; and a healthy utopian future. I argue that the Israeli and Qatari national biobanks imagine participation in ‘global science’ while at the same time they reinforce local ethnic identities. The Israeli biobank reflects pre-existing ethnic identities in Israeli society, while the Qatari biobank preferentially emphasizes the emergent national character of the Qatari population. As a comparative study of genetics and ethnic identity in the contemporary Middle East, this research, therefore, speaks both to the social theory of the co-production of science and society and to the anthropology of nation and state building.

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Author's note

The text of this dissertation was written solely by the author, except where otherwise stated. Chapter 2 contains elements of a paper that was written in collaboration with Lauren Herman, a shorter version of which was published in *The Journal of Law and the Biosciences* (McGonigle and Herman 2015). Chapter 2 also includes parts previously published in *Transversal: Journal for Jewish Studies* (McGonigle 2015). Any previously published material that is reproduced here has been granted permission by the publisher. Likewise, any images or figures that are not 'public domain' have been granted permission for reproduction. This dissertation has not been submitted, in whole or part, for a degree or diploma at any other university.

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Preface

The topic of this dissertation is ethnic genetics, and the context is the contemporary Middle Eastern ethnonation, exemplified by Israel and Qatar. In this framing, this dissertation may be best read as a comparative anthropology of scientific objects. It is at its core an attempt to clarify the theoretical problematic of the relationship between scientific objects and the valuating context of their emergence. Herein the relation between context and content is explored in two cases so as to elucidate the relationships between ethnic genetics and its broader context more generally. The implicit political normativity underpinning this line of thinking is a commitment to keeping possibilities open, and to unsettling reified ethnonational identities and taken-for-granted identitarian imaginaries. The intellectual value of this critical approach lies in the power of possibility that a responsible criticism of the relationships between science and society renders. In this sense, this reading of science and society entails an implicit proposition of 'the otherwise,' wedging open a gap of possibility between science, as the self-imagined reportage of 'what is,' and politics, understood as the battleground of 'what could be.' An effective critique of science ought to shift the balance towards the latter.

This dissertation is also the fruit of a personal intellectual journey. I became interested in philosophical and anthropological questions about science while I was a biochemistry researcher in Cambridge UK, where I was working in a laboratory doing research on the structure and function of brain neurotransmitter receptors. In my spare time I had been reading authors like Michel Foucault, Pierre Bourdieu, Herbert Marcuse, Mary Douglas, Claude Levi Strauss, Philippe Descola, the British structuralist and functionalist ethnographies, and accounts of Amazonian shamanism. I became fascinated by questions of epistemology, ontology, and how scientific objects, and comparatively, diffuse ‘indigenous’ objects, like plant spirits, can appear and disappear, in different historical periods, or indeed simultaneously, synchronically, cross-culturally. What is the cultural basis of a scientific object, in short?

On an English winter evening during the month of Ramadan, I found myself in a Palestinian café on Cambridge’s Mill Road, pouring over Claude Levi Strauss’ *The Savage Mind* while puffing on a nargila and sipping sweet mint tea. Around this point, my fascination with philosophical anthropology melded with a curiosity for the Middle East. This was perhaps the moment of no return, from whence I would take decisive strides to become an anthropologist and explore anthropological questions about nationalism, identity, and epistemology in the Middle East.

In bridging the gulf between my training as a bioscientist and my nascent passion for anthropology, I began thinking about what a reflexive philosophical anthropology of scientific objects would look like. Specifically, I started seriously considering the practice of cultural translation in the field of Ethnopharmacology, the study of indigenous drugs. This topic became the basis for my master’s paper at the University of Chicago, which was later published as an essay in *Ethnos* (McGonigle 2017). The writing of that paper also consolidated a theoretical understanding I had been grappling with for several years, a proposition of epistemological ‘symmetry’ and a commitment to a type of responsible critique that levels science with politics, ethics, morality, and other human values. Rather than pitting indigenous facts against scientific facts, in an asymmetric global power relation that would necessarily impugn non-scientific ways of knowing, I became interested in the relationships between facts and the politics of their respective contexts. In essence, this brought me to an anthropological reading of science as a political discourse of world building, finding my intellectual niche at the productive intersection of philosophical anthropology and science, technology, and society (STS).

While taking a class on sacred spaces in contemporary Israel with visiting Professor Yoram Bilu (of the Hebrew University) at the University of Chicago, I began cultivating an interest in broader Israeli society. I decided shortly afterward that the Middle East would be a fitting site for a contemporary study of science and society. I wrote a research proposal that focused on the role of ethnic genetics in Israel and in preparation for fieldwork I began learning Modern Hebrew. While spending a year as a visiting fellow at Harvard's STS program, where I came to hone my STS thinking in relation to my doctoral project, I formed a working relationship with three exceptional professors, an opportunity that motivated me to make moves to try and continue my studies at Harvard, where I, fortunately, enrolled in Fall 2014.

After securing a generous postdoctoral fellowship (funded by the Israel Institute) to do fieldwork on ethnic genetics in Israel and the broader implications for Israeli society, I moved to Tel Aviv for a year of fieldwork. It was during this time it became clear that extending the question of ethnic genetics to a second field site would enrich the project and bring into focus the way in which the political context has specific manifestations in the science and its appropriation by broader society. I surveyed other small ethnic states in the Middle East that have significant biomedical research developments, and I decided to extend my project into a comparison with biobanking developments in Qatar, where the ethnic Qataris are a demographic minority, yet the state is heavily investing in the biosciences. I made a research trip to Doha to collect data for this portion of the project, and after finding a National Biobank and National Genome Project in Doha, the project became a comparative study of Israel and Qatar. The enriching comparison of ethnic genetics in both Israel and Qatar defines the core thesis of this dissertation: that *the molecular realm is an emergent site for articulations of ethnonational identity in the contemporary Middle East.*

As a trained scientist doing research amongst scientists, in laboratories, and at scientific conferences, fieldwork often felt like 'anthropology at home': A 'relative native' scientist working with, and studying, science from an anthropological perspective. As the anthropologist of Amazonia Eduardo Viveiros De Castro (2013:473) writes on the relative stance of the anthropologist in the field:

> "The 'anthropologist' is a person whose discourse concerns the discourse of a 'native.' The native need not be overly savage, traditionalist nor, indeed, native to the place where the anthropologist finds him. The anthropologist, on his part, need not be excessively civilized, modernist, or even foreign to the people his discourse concerns."

What is important is that there is a relation between the anthropologist and his informants that generates knowledge. I thus embodied both a partial native and a visitor role in the field. Indeed, the anthropologist need not be entirely native, or foreign. What matters is that the anthropologist's partial identity generates a relation of knowledge production. As a member of the tribe of scientists, I entered the field self-presenting as a scientist-anthropologist, with an acquired identity that was hybrid, partial, and indeed 'relatively' native. But in Israel, I was not Jewish, and in Qatar, I was not Muslim. This partial insidership and outsidership has had an impact on the nature of my fieldwork role, a significant methodological impact in terms of my participation. It influenced the nature of my relationship with my informants, a heavy ethical impact in terms of what I bring and ask for. It also shaped the quality of the data collected, a definitive empirical impact on how data is acquired. These issues will become evident in the form of this dissertation.

This project also forced me to engage in a sustained consideration over what it means to be a ‘good’ anthropologist of science. How close does one align (politically, professionally, personally) with the people one studies? To what extent does it help to be in the lab with the scientists, as opposed to the interviewing and leaving approach? I have worked with my informants at length, and the relationship has been somewhat symmetrical and reciprocal: I have invited them to academic conferences, and I have co-authored scientific papers with them. Moreover, I have taken seriously the ethics of maintaining ethical relationships with one’s informants, recognizing and sometimes aligning with their interests. Working with scientists in both Tel Aviv and Doha has been a two-way relationship, and I hope to maintain collaborative links in the future and to develop shared projects. For example, I have had discussions with scholars in Doha about working with them on their bioethics protocols. Moreover, when I co-organized a two day symposium on ‘the molecularization of identity’ at Harvard in April 2016 I invited two of the scientists that I worked with in Tel Aviv, David Gurwitz and Noam Shomron, to present their views on biobanking and genetic privacy. I have found it to be both personally rewarding and methodologically insightful to engage with David and Noam both as actors in my field of study and as teachers and experts in their fields. In this regard, a certain practical ‘symmetry’ has been achieved where my anthropological research has become dialogical. I take pride in the fact that my informants are very much active voices in the conversation, and I am humbled by the expertise that speaks back to me when their generous knowledge duly corrects my assumptions.

A word on disciplinarity or, rather, a caveat on the genre. This dissertation engages anthropological theory, STS, intellectual history, critical theory, Middle Eastern studies, cultural studies, and critical legal studies. At the same time, this is not a traditional ethnography of the laboratory. While I spent many months in the lab in Tel Aviv, gaining essential data and through these inroads experiencing countless rich ethnographic moments, some of the most persuasive data that inform this dissertation have come from public records, legal and historical sources, published scientific papers, institutional reports, websites, and brochures. I make my argument with the purposeful juxtaposition of material from diverse methodological registers: image, text, ethnographic moments, documents, downstream research outputs, and the formal legal discourse of the state, with an attentiveness to the genealogy of ideas and their dependence on technologies. This 'wide horizon' approach is necessary for the apprehension of scientific objects. Scientific objects ride various channels of mediation to stabilize their ontologies in the present (texts, institutions, laws, graphics, etc.). This form of writing is a likely consequence of pursuing a diffuse anthropological topic such as 'ethnic genetics,' which is not definitively grounded in a single institution, locale, or set of actors. This work, as it has become clear in hindsight, began with a theoretical question and not an ethnographic site, and for that reason, the diverse ethnographic material may appear disjointed. This form must be explained as a consequence of my trajectory to becoming an anthropologist, which has been a sharp learning curve.

Indeed, the form of this text is also somewhat commensurate with the interdisciplinary training I have received along the way: I have been an affiliate in the Harvard STS program for several years, where I have participated in seminars and workshops dealing with science and society in an interdisciplinary context. Moreover, my time at the Edmond J. Safra Center for Ethics at Tel Aviv University consolidated a Habermasian commitment to thinking 'around' societal *problematiques* rather than advocating a normative position from 'within.' Further, my interest and dedication to the anthropology of science were nurtured on continental critical theory and French philosophical anthropology, and these diverse influences shape the style of reasoning arrived at here. Ultimately, though, I am reading science as culture, and grappling to ground the theoretical issues in concrete and localized ethnographic spaces.

In *Ethnography and the Historical Imagination* (1992:6), Comaroff and Comaroff contend that "ethnography serves at once to make the familiar strange and the strange familiar, all the better to understand them both." For an ethnography of science, this process of 'making strange' would demand not engaging as a full native in the laboratory, but partially remaining in a zone of ambivalence, focusing on the historical determinants that have rendered the present conditions normative and not taking the *status quo* for granted. Concerning the naturalized cosmology of science, they elaborate (6):

> "it is arguable that many of the concepts on which we rely to describe modern life—statistical models, rational choice and game theory, even logocentric event histories, case studies, and biographical narratives—are… our own rationalizing cosmology posing as science, our culture parading as historical causality."

For this reason, they argue for what they call a "genuinely historicized anthropology" (1992:6). This historicized anthropology would mean also digging into the specificities of how the present was arrived at, and interrogating the political *a priori* that renders the present possible. To extend these insights to an ethnography of epistemic practices themselves, in this case, the biosciences, demands the uncoupling of fact from value. Ethnography itself, of course, does not achieve epistemic supremacy, a God's eye view. Rather, ethnography itself is replete with epistemological uncertainty, but this condition of ethnography, Comaroff, and Comaroff contend, "personifies, in its methods and models, the inescapable dialectic of fact and value" (1992:9). An ethnography of science must, therefore, be about unsettling the taken for granted; it ought to be a true historicization of facts, a telling of the story of the relation of scientific fact to its own genealogy.

These insights, this research, and my ethnographic experience tracking the phenomenon of the 'molecularization of ethnicity' raise an open question about the method of the ethnography of scientific objects. The question, beyond the scope of this dissertation, pertains to the location of the scientific object, in this case, ethnic genetics. In one sense, I am studying the scientific object as a window into the historical causality that is the fabric of the societies I am studying. The rationalizing cosmology of nationalism, it is presupposed, can be apprehended through the study of molecular genetics. Such a theoretically ambitious proposition raises methodological questions: How does one study something as diffuse and multi-sited as 'ethnicity' in relation to science, and indeed, reciprocally, 'science' in relation to ethnicity? The question is one of scale, location, and modality of attentiveness. The question also leads to a dialectic, or a 'co-production,' of science and society (Jasanoff 2004). At issue is the way one finds the broader context in the minutiae of scientific discourse, and likewise how one tracks the wider social life of scientific practice outside of the laboratory. This proffered question at the outset – and the entailed problematization of ethnographic location – is to gesture towards a conversation about the productive intersection of anthropology and STS. This work, I confess, is more of an anthropology of scientific objects than an anthropology of scientists, or indeed an ethnography of the laboratory. It centrally concerns the way in which elusive metaphysical imaginaries, like 'the nation,' or 'ethnicity,' appear or disappear in the epistemic products and consequences of scientific activity. Crucially, I focus on the constitutive societal relationships that frame this process, and the attention here is on the imaginations of peoplehood as it is woven in and out of scientific practice.

But science is a globalized discourse, and one must oscillate focus between the general and the particular, the global and the local when reading science *qua* culture. Attention to scale must be varied and wide, simultaneously local and global. Moreover, scientific objects that do not speak for themselves, but are of course constituted on the plane of totality through human mediations and in diverse ontological registers. In this work, I am thus attempting to put into focus the implications of science and technology for broader society. I am attempting to frame the role of science in society at large, and consequently, the focus must extend more broadly than the laboratory itself. This dialectic of context and content demands that one capture the way in which science is appropriated within the society, and likewise one must tackle the way societal particularities, like ethnic imaginaries, bleed into scientific discourse. For these concrete reasons, the genre of this text is varied. I attempt to show how the ethnonation appears in scientific discourse in various ways and at varied sites, be they texts, policies, reports, visual culture, or controversies. In this regard, the approach remains somewhat ‘experimental,’ to borrow an indigenous concept from the field.

Herein, then, an examination of the ways in which science and society unfold in two Middle Eastern ethnonations.

Epigraph

“Does not the threat of an atomic catastrophe which could wipe out the human race also serve to protect the very forces which perpetuate this danger?” (Marcuse 1991[1964]:xi)

“The historical character of the ‘facts’ which science seems to have grasped with such ‘purity’ makes itself felt in an even more devastating manner. As the products of historical evolution they are involved in continuous change. But in addition they are also *precisely in their objective structure the products of a definite historical epoch, namely capitalism.* Thus when ‘science’ maintains that the manner in which data immediately present themselves is an adequate foundation of scientific conceptualisation and that the actual form of these data is the appropriate starting point for the formation of scientific concepts, it thereby takes its stand simply and dogmatically on the basis of capitalist society. It uncritically accepts the nature of the object as it is given and the laws of that society as the unalterable foundation of ‘science.’” (Lukács 1972[1923]:7).

“a concept such as that of ‘fact’ can itself be understood only as a consequence of the alienation of human consciousness from extra human and human nature, which is in turn a consequence of civilization” (Horkheimer 2013[1947]:120).

Introduction

Identities Matter

"Do you have any other passports with you today?" probed the *El Al* security lady. Had she had asked if I were a dual citizen, or if I were traveling on more than one passport I could have evaded scrutiny by saying no, but the truth was that I had brought my second 'Gulf' passport. "Yes, I have two Irish passports, one that I use for travel to Israel and one that I use only for travel to the Arab Gulf states, for my academic research," I replied. She directed me forward to a podium where an older security officer, tanned, bald, and muscular, with twin handguns bulging behind his fitted navy blazer, began a slew of questions.

Identities can be multiple, identities can be exclusive, and identifications can exclude. In the Middle East, it can be difficult to be friends with everyone. You may have to pick a side, present an identity, and make your loyalties visible. Attempting to be a 'neutral' anthropologist is not always possible. Traveling between the Arab Gulf and Israel, for example, presents difficulties, especially when your passports contain stamps of a country that other states don't recognize. The role of the anthropologist as a relatively impartial outsider comes under strain when traveling between quasi-enemy states. Practically, at least in my case, this meant that travel to Israel became difficult because of evidence of travel to Arab states. Reciprocally, travel to some Arab states is impossible with an Israeli visa or stamp.

By the time I decided that I was going to include Qatar in my study, I had already been living in Israel for several months, so I decided to go to the Irish Embassy in Tel Aviv and request a duplicate passport. A 'clean' passport would facilitate safe and smooth passage to the Gulf, where I needed to travel for my research. I submitted my application and after a few weeks of waiting, I collected my duplicate Irish passport from the Embassy. There were no major problems getting a second passport, and I had no difficulty traveling through Dubai, Doha, or Muscat during the following year. At that point, I believed that an unmarked Irish passport would be enough. But there were nonetheless difficulties.

After I had completed my year in Israel and settled back into life in Cambridge Massachusetts, I made a return trip to Israel for the Edmond J. Safra Center for Ethics' turn-of-year workshop, a two-day retreat in the Judean hills outside Jerusalem. Outgoing Fellows like me would present their research and incoming Fellows would introduce themselves and become familiar with the goals and workings of the Center. My Uber dropped me at Boston Logan in plenty of time to check in on the *El Al* overnight to Ben Gurion Airport. I took my place in the security line that precedes check-in for *El Al* flights. As the national airline, *El Al* has heightened security beyond any others I have experienced in my travels. While Israeli passport holders are swiftly ushered on to the check-in desks, other nationalities may face anything from a few security questions to a sustained interview.

The questions lasted over an hour, and mostly centered on the summer months I had spent in Muscat: Had I been in touch with locals? Had I been asked to convert to Islam? Was I still in contact with anyone there? After about twenty minutes, the questions turned to my activities in Israel, whom I knew there, and why I was returning. At one point the agent asked if I had learned Hebrew, and when I said yes we switched languages and continued the interview in Hebrew. During this time I noticed, by chance, that my Hebrew teacher from Harvard, Osnat, was approaching the security check. She was dropping her son off at the airport. When the security guard asked me where I learned Hebrew, I pointed out Osnat as my teacher. The security guard shuffled over and had a brief conversation with Osnat (who, I subsequently learned, had personally vouched for my character), and then he ushered me on to the ticket desk.

The flight was now closing, and the security staff were rushing to process the remaining passengers as fast as possible. The female guard directed me to the side again, where a younger male Israeli security agent performed a rushed but meticulous search-and-swipe analysis of my hand luggage. When I was finally approved to proceed, the security agent began peeling an orange security sticker for my passport. Just before he succeeded to attach the label, another guard abruptly intervened, shoving two American passports into the palm of the agent, telling him in Hebrew "two more Americans… Jews, however." Till this point I was tolerant and understanding that the security procedures I was being subjected to were fair, reasonable, and beneficial to the security of all the passengers of the flight, but this intervention, and the justification that the two remaining American passengers should supersede me in the queue for approval because they were "Jews, however," struck me as illiberal, unseemly, and offensive. Further, the insult seemed underhanded, as I presume he thought that I didn't understand the Hebrew comment. Though these two passengers were officially American citizens, their Jewish identity entitled them to priority in terms of security and service.

Unmarked passports can carry identities beyond their legible inscriptions. Invisible identities matter.

I include this anecdote as an example of how the 'ethnos' slips into daily life, thought, and practice. Much like how the American passports slipped into the guard's hand ahead of mine, ethnic identity slips into daily consciousness in Middle Eastern ethnonations. It is the reading of this “Jews, however” moment that I want to hold in mind when approaching genetics research and the application of genetic knowledge of ethnic populations. How do invisible essences, markers of ethnicity, intervene and reinscribe a category of inclusion in the institutions and practices that orbit basic science? How is ethnic exceptionalism part of the medical research of ethnic populations in the Middle East, or anywhere? My core empirical question is: How is ethnicity being read in invisible inscriptions in biomedical research? These are important questions as we face the potential of genetics being used to determine citizenship rights.

Already the governments of Israel (Zeiger 2013) and Kuwait[1] have said that in the future they may use genetic tests of the whole population of citizens, either in determining who has the right to become a citizen, or in cataloging citizens in a genetic registry. This potentiality alone renders what I term ‘the molecularization of identity,’ a crucial site for anthropological engagement. But before I begin to tell the story of the molecularization of identity in Israel and Qatar, I must lay the ground by outlining the state of genetics research, so as to correctly situate my anthropological analysis in the context of global genetics in the age of “biocapital” (Sunder Rajan 2006).

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[1] Cook, M. (2016) Kuwait becomes first country to demand universal DNA tests. *BioEdge* Aug 27, accessed Mar 1 2018, at https://www.bioedge.org/bioethics/kuwait-becomes-first-country-to-demand-universal-dna-tests/11974#disqus_thread

Biopolitical Futures and Personalized Medicine

At a recent TEDx talk[2] in Tel Aviv, Noam Shomron, a leader in the field of genomics, opens with the question

> "What if I told you I could read your DNA, your genetic makeup, your book of life?... Are you interested?... I can give you a vast amount of information about yourselves that will help you lead better and longer lives, isn't that wonderful? Do you want to?"

He purposively voices the exaggerated promissory narrative that often obtains in genomics research before proceeding to give a lecture about the potential for how therapies may be improved in the future. But the lecture also addresses the ethical problems that come with the knowledge of the self that genomics offers. "We are reaching a time we call 'DNA of everything.' We will be able to read the DNA of everything around us." He describes his lab as a "Genomic Intelligence Team" that has been sequencing the DNA of hundreds of patients over the past years, identifying the exact mutations that cause their medical conditions. The lecture is not just hype or propaganda in favor of genomics and its regimes of valuation, but rather a thoughtful consideration of what genomic technologies may mean for society at large: should individuals with mutations that render them susceptible to infection be banished from schools? Could children who might develop a disease later in life be aborted? Should politicians have to disclose their genetic information to ensure that they will remain healthy during their tenure? The lecture develops the idea of "responsible genomics" that is giving people the "right information at the right time." To do this, the lab is dividing genetic information into the "private parts" and "public parts" and ranking genes based

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[2] "Should you read your DNA?," Noam Shomron, TEDxTelAvivUniversity, accessed Jan 10 2017, https://youtu.be/NgVwPj54TEo

on their risk in terms of potential disease.

Advances in genomic technologies, amalgamated in the power and scope of their claims to truth with complex computational analyses, are fast ushering in a new regime of healthcare treatment. It is becoming widely imagined by scientists, clinicians, and policymakers, that soon, individuals will be treated with personalized, precision, therapies tailored to their particular genetic and medical (specifically pharmacogenomic) profile. Therapies will soon be designed and customized to fit each patient better, so the story goes. While these technological developments afford real and valid hope for improvements in the treatment and prevention of some illnesses, they raise biopolitical and ethical concerns while simultaneously providing a lens through which a utopian, and collectively shared, future is imagined.

Precision, stratified, or personalized, medicine denotes emerging medical models that use molecular diagnostics, genetic sequencing, cellular analysis, and pharmacogenomics, to tailor individual healthcare treatment and prevention. By taking genetic, environmental, and lifestyle factors into account, and by relying heavily on big data analysis, precision medicine aims to identify risk factors and biomarkers that predict health outcomes and help choose the best treatment for the patient. Recent advances in the speed and efficiency of genetic sequencing technologies mean that clinicians will very soon be able to quickly and cheaply obtain the full genomic sequence and transcriptome (the DNA sequences turned into messages in cells) of their patients. Genomics is thus becoming discursively constructed as central to the development of an effective system of ‘personalized’ medicine.

The scientists I met during this research were not naïve technocrats driving their science forward because of their professional, commercial, or nationalistic agendas. They typically are acutely aware of the ethical concerns and responsibilities they carry in their work and they are often vocal contributors to public debates on these matters. However, the field of genomics takes place in specific contexts and with unique characteristics in each location. The genomic technologies that precision medical models rely on have also been used to describe the genetic structure of particular regional and national populations, thereby making genomics both an engine for driving visions of a generic utopian future based on technical progress as well as a window for viewing particular biological understanding of 'natural' ethnonational, or racial, communities. The general movement of genomics entails unique particularities in distinct contexts. While genomics gets grounded in different national spaces, it makes claims towards technological progress in a positive, progressive, direction, even as biomedical development unfolds in local, nationally specific ways.

Such a confluence of national imaginaries and global promissory futures is powerfully epitomized by the phenomenon of the 'national biobank,' which entangles the unique health concerns and the sense of collectivity of a single national community, while also contributing materially and metaphysically to the global progression towards personalized medicine. The citizen, Sunder Rajan (2006) has argued, becomes both consumer and 'patient in waiting.'

National biobanks have already been established in Iceland, Canada, Australia, Japan, Singapore, Kuwait, Israel, Thailand, Belgium, Luxembourg, Estonia, South Korea, Dubai, and Qatar. These biobanks are rich sites for scholars in the anthropological and social study of science because they at once reveal a global trend in the ethnopolitics of biomedicine while exposing the individual politics and rationalities of the national community that incubates them, and that installs in them a symbolic charge as repositories of a shared national substance.

The future practical success of precision medicine, however, depends on the establishment of these large databases that collate diverse data, including family genealogies, disease histories, drug sensitivities, and genomic data. While these initiatives hold promise, they also raise social and ethical challenges, specifically regarding the enrolment of volunteers into large genetic databases; the need for a change in the mindset of clinicians, patients, and the broader public; and the need for interdisciplinary ethics considering the emerging issues. In other words, the future potential of ‘personalized’ medicine crucially depends on ‘collective’ participation of informed citizens and a wide range of stakeholders. So far, nation-states have been the leaders in driving and directing these developments and gathering such data sets.

In 2012 the UK Prime Minister David Cameron launched a £300-million, 5-year initiative to sequence 100,000 genomes from UK National Health Service (NHS) patients with rare disorders, cancer, and infectious diseases (Marx 2015). Similarly, early in 2015 US President Barack Obama announced a $215 million effort that will couple patients’ physiological and genetic data to improve the ‘precision’ of individual treatment.[3] The Chinese government followed in March 2016 and launched the ‘China Precision Medicine Initiative,’ a 15-year $9.2 billion plan to establish the country as a global leader

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[3] White House, 2015. “Factsheet: President Obama’s Precision Medicine Initiative,” Press release, Jan 30, https://www.whitehouse.gov/the-press-office/2015/01/30/fact-sheet-president-obama-s-precision-medicine-initiative; See also Reardon (2015).

in precision medicine.[4] Comparable projects are also underway in Australia, Japan, Canada, Singapore, Kuwait, Qatar, Israel, Thailand, Belgium, Luxembourg, Estonia, and South Korea. The medical benefits entailed by these ventures could be great, but the impact on the way healthcare will be practiced and how citizenship is performed in the 21st-century has yet to be fully apprehended. Further, "precision medicine," it has been argued, "is much more than just genetics."[5] While it is thought that precision medicine will also lead to the 'prevention' of many diseases, such data gathering efforts will also likely lead to new therapeutic strategies, entailing new ways of thinking about the role and experience of the patient. This will change the limits of disease experience, such as what counts as healthy or unhealthy, and at what point medical intervention is recommended. Likewise, the way disease categories are taxonomized will also change (European Science Foundation 2012; National Academy of Sciences 2011). For example, in the future diseases might become taxonomized on the basis of the underlying genes or variants, rather than on a similarity of symptoms.

The next stage of precision medicine now depends less on technical and scientific advances than on ethical and socio-political developments. A prerequisite for meaningful and statistically significant genetic readings of patients and the implementation of useful pharmacogenomics databases is the voluntary and informed participation of healthy populations. Large-scale genetic database projects are crucial to the bridging of individual molecular-genetic readings with clinical diagnostics. This, in turn, could reveal

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[4] "China's 'precision medicine' initiative gets lift from latest genomics company funding." May 2 2017. http://www.scmp.com/tech/china-tech/article/2092362/chinas-precision-medicine-initiative-gets-lift-latest-genomics

[5] Lewis, R. (2015), Precision Medicine: Much More Than Just Genetics. *PLOS Blogs*, at http://blogs.plos.org/dnascience/2015/09/24/precision-medicine-medical-genetics/

how the diverse genetic makeup of populations relates to individuals' varying responses to treatments. This means that massive databases will probably be established, collating family genealogies, disease histories, drug sensitivities, and genomic data in an integrated system. Noam Shomron told me in an unstructured interview that it is also becoming more common in cases when a family member is ill that healthy relations are also sequenced, or in some cases asked to act as treatment 'controls,' to help identify the pertinent genetic factors. To make the system of precision medicine work better, however, quality long-term medical records and oral family medical histories will also be essential in meaningfully amalgamating clinical, historical, and genetic data.

The transformation of healthcare from treatment to prevention, therefore, necessitates a major change in the mindset on the part of clinicians, scientists, patients, close family members, and the healthcare industry in general. Accordingly, in his recent editorial, 'Prioritizing personalized medicine,' Noam reported Michael Hayden's (of *TEVA* Pharmaceuticals, a large Israeli pharmaceutical company) assertion that the major challenge facing personalized medicine is, in fact, the 'reversion of healthcare from treatment to prevention' (Shomron 2014). Hayden pointed to the potential of next-generation sequencing (NGS) to be a major boost towards the development of personalized medicine but emphasized that healthcare providers still need to embrace the 'idea' that genetic information is an important part of medical treatment. The imagination of progress must be widely mediated across these different sets of actors. The unfolding of personalized medicine and the building of large-scale databases with the collective and voluntary participation of both patients and healthy citizens depends precisely on such a change in ‘mindset.’ Health identities must be reconfigured. Novel sociotechnical imaginaries must be consolidated. New populations may be brought into being.

Moreover, the kinds of collaboration between clinicians, patients, scientists, and the broader public that drive these developments will likely change, as the patients’ and health professionals’ roles evolve. Furthermore, wider public engagement in debate and decision-making could further public engagement in what has been called good ‘citizen science’ (Prainsack 2014a). While the benefits such databases will usher forward may still be unknown and, perhaps at this point inestimable, some of the problems that such collective projects raise are already very clear: genetic privacy; the ethics of data sharing; the impact on health insurance; the rise of medical ‘risk’ status; and the psychological effects on people and close kin, particularly if they are informed of their carrying a pernicious risk factor.

Genetic databases raise important anthropological and ethical questions. For example: What is the social nature of the ‘individual’ person in their community (Prainsack 2014b)? Who owns genetic data? What are the risks of sharing family data? What will be the negative impact of unearthing latent, but potentially negative, genetic data? Will the human genome be broken into regions, or novel ‘families’ of genes, weighted differentially and dynamically according to their known significance? And, what are the legal, or “bioconstitutional” (Jasanoff 2011:3), provisions for participants who may wish to withdraw their personal, or relatives’, medical-genetic data later on (Gurwitz 2015)? Biobanks, however, are not an unprecedented phenomenon in terms of the sharing of biological material. There are many suitable comparisons to aid the anthropological analysis of genetic databases for personalized medicine. In Israel, for example, a voluntary blood donation system has been established by the National Transplant Center.[6] Under this plan, individuals who elect to donate blood receive a government identity card assigning them priority to receive future emergency blood donations.[7] There is also a similar system in place in Israel for organ donation,[8] called the "Adi card."[9] Signature of an Adi organ donor card expresses the willingness of the holder to donate their organs after death, so as to help save the lives of patients waiting for an organ transplant. The names of signatories to the Adi card system are deposited in a confidential database, and possession of a card grants priority to the holder on the transplant waiting list, and also to their close relatives, should they need a transplant. Both these established donor systems already merge neoliberal market logics (foregrounding individual choice), with altruistic values and the participatory ethics and solidarity of a collectivist society. That is to say participants gain the option of personally benefitting from their contribution, but it nonetheless remains more likely that individual contributions will help others. These systems may be similar in their working to the emergent personalized medical models, in which individuals could volunteer personal data in order to be accorded both direct benefits, by way of access to personal health assessment, and indirect benefits, by helping the wider community become healthier.

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[6] "The National Transplant Center was established by the authority of the Ministry of Health in 1994, with the purpose of creating an official and independent body for the management and coordination of organ donation and transplantation in Israel." Accessed Feb 26 2018, at https://www.adi.gov.il/en/about-us/

[7] Magen David Adom in Israel, accessed Sep 20 2015, https://www.mdais.org

[8] See Mor and Boas (2005), and the Israel Organ Transplant Act 2008, accessed Nov 4 2015, at http://www.declarationofistanbul.org/resources/legislation/267-israel-transplant-law-organ-transplant-act-2008#

[9] The National Transplant Center, accessed Sep 20 2015, https://www.adi.gov.il

But individual patients and citizens may have distinct objections against sharing their genetic data, perhaps out of skepticism or fear of the impending changes in the way medicine is practiced. For example, with the advent of personal genomics and deep sequencing, we can only expect a rise in the number of identifiable ‘risk factors,’ and prophylactic medication on that basis. One legitimate public concern is that the emerging logic of ‘prevention by treatment’ could go too far, costs would spiral out of control, and whole populations could become overmedicated for ‘risk’ (Sunder Rajan 2006) with millions of people being put on multiple long-term prescriptions for life (Dumit 2012). That said, personalized medicine still holds real promise, especially for rare genetic ‘orphan’ diseases, which have generally been neglected by the mainstream pharmaceutical industry, and which need and deserve more attention in order to deliver a parity of care to the sufferers of such rare diseases. Furthermore, as people are now living longer, the impact of neurodegenerative and autoimmune diseases (so-called diseases of aging) will only become greater. In this regard, genetic predispositions for late-onset diseases will also become more important as we enter the age of risk and prevention. This issue will become clear in the research I describe taking place in the lab in Tel Aviv.

Biobanks and genetic databases also impinge on the configuration of privacy, the way in which the national collective is understood, and crucially, on the ontology of the ‘individual.’

Genetic Selves

Identifiable human genome data is becoming increasingly used in research. Technologies for sequencing and storing human genomic data, and for analyzing genetic information, are rapidly increasing in speed and power. These technical advances necessitate appropriate governance and ethical policies so that individuals and groups can be sufficiently informed about the stakes and so they can protect their genetic privacy accordingly. A major challenge, and an important ethical consideration in the development of personalized medical models, however, is the establishment of databases that couple genetic and phenotypic data (clinical information about the person), which at this point are considered sensitive data. Databases pose difficulties as to how to protect the genetic privacy of volunteers consenting to the use of their personal sensitive data. Moreover, the significance of those data may change as technologies and analytic capacities increase in power, making it important to have long-term security measures in place. And genetic data may hold different levels of importance in different contexts. Some communities have a low threshold for sharing their clinical and genetic data. For example, some patients might desire to share their data to help further medical research, especially in cases of rare genetic diseases where personal family history is involved. But as technologies change and the entailed amount of personal biomedical data increases so do the concerns for genetic privacy.

If sequencing, for example, moves from sequencing DNA to sequencing RNA (a molecule related to DNA with a wide range of biological roles), a likely future development, this would require re-evaluating the information yielded from each technology and also the degree of vulnerability of each dataset. Public trust is thus crucial if the science is to proceed. Trust, however, is needed not only between researchers and participants but also between governing bodies and scientific communities. Already there is a rise in doctors, genetic counselors, and for-profit companies interested in genomic data. On the other hand, patients may start to come to the clinic or research partnerships with more genomic knowledge than the researcher is seeking to investigate (they may have sequenced their genome already), raising the issue of the 'symmetry' of the levels of information and power between researcher and participant.

Other ethical and anthropological concerns should be mentioned in relation to the social nature of genetic data. An interesting question arises concerning the proposition that genetic data might be considered 'individual personal property,' which can be legally protected as such. Since humans (usually) gain their genetic signature through biological inheritance from two parents, which they share with siblings, much information about an individual can be extrapolated by examining close relatives' genetic data. The fact that genetic data, or metadata, could be easily acquired by investigating a person-in-question's close relatives challenges the notion that genetic data is 'individual' in any categorical way. Rather, personal genetic data are precisely 'dividual' in nature. Dividuality is an anthropological concept from the study of kinship that describes the intersubjective nature of personhood in contextualized social relations. The dividual self is a distributed entity, relationally constructed, partible, composite, and essentially divisible (Gell 1998; Mosko 2015; Strathern 1988; Wagner 1991). In relation to genetic personhood and notions of the limits of personal privacy, human genetic personhood and identity might be better considered as being 'dividual' in nature, rather than individual, in the sense that genetic data are usually partially shared with close kin, who may also share relevant family, health, and life experiences.

The fact that genetic data and the associated personal medical data are precisely 'dividual' in nature may impact ethical standards, legislation, and governance structures.

Legal ‘individual’ citizens will have to recognize that when they disclose their perceived personal genetic data publicly they inadvertently also share data about their biological kin. The disclosure of genetic data may, therefore, entail damages to related individuals who could suffer as a consequence. This potentiality raises more questions about collective consent, responsibility to disclose or restrict data, and the limits of personal and family privacy. But this concern for privacy is in tension with a growing economic valuation of data.

Very soon personalized, precision medicine will be a viable option for many patients. With the advances in the speed and ease of complete genomic sequencing, and in-the-clinic sequencing of other molecules and states (RNA, chemical modification of DNA and more), it will likely be possible to make better diagnoses and design more effective, tailored treatments for patients. This development will impact the commercial value of data. Individuals with certain genetic markers could be identified in advance as a potential customer for certain drugs or therapies. This kind of tailored, targeted treatment could improve outcomes and prolong healthy life. It also could entail more focused direct-to-consumer marketing of medications and therapies, particularly in relation to long-term prophylactics, like drugs for treating lifestyle diseases (such as hypertension, hypercholesterolemia, or obesity), or indeed common psychiatric drugs (like antidepressants, anxiolytics, and drugs for attention deficit disorder). Populations that have volunteered their data could quickly become potential customers to pharmaceutical companies, and as such, they may want to be able to restrict the access other agents have to their genetic data. On the other hand, as bearers of valued data, they may also wish to capitalize on that data. By sharing their genetic data with insurance companies, for example, individuals could potentially benefit from being classed at a lower risk for some conditions, and may perhaps even benefit from a lower insurance premium. All this means that the individual self could become a multitude of probabilistic data sets, which overlap with biological kin, and with the broader national cohort. In this way, national citizenship becomes entangled with biomedical research and clinical treatment.

Citizens could also become a new kind of biological citizen-consumer, extracting value from their personal data. But since national publics have typically been paying billions of dollars in annual health insurance policies or through state health programs, thus allowing the companies to become large and influential, it is arguably the responsibility of the companies to reciprocate and pay back something to the community, perhaps by sponsoring data sharing initiatives. This could be seen as a pro-active step to prevent diseases, to help detect them early on, and to categorize patients at risk and carefully monitor their health. In fact, an insurance company in South African and the UK, Human Longevity, made the pioneering move and started offering subsidized genetic tests to its policyholders, as long as they opt to take actionable decisions that can defer potential sickness.[10] Incentives like this might help insurance companies and their customers begin to work together to improve human health outcomes and to lower disease risks. Such potentials in data sharing and personal genetic medicine will probably lead to the development of algorithmic systems that can measure the relative value of the data relating to specific genes, groups of genes, or RNA. With the tremendous market value that is created by these sequences and their complex relations, the importance of

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[10] See Human Longevity, Inc., accessed Mar 6 2018, at http://www.humanlongevity.com

anthropological research on privacy, protection, and anonymity in relation to genomic research becomes more salient.

Having sketched here the political economy of precision medicine, and outlined some of the ethical and social concerns at play – which are crucial for this dissertation – I move now to review the literature in the anthropology of science, Middle Eastern studies, and critical theory.

The Interface of Anthropology and STS

Pierre Bourdieu (2001) devoted his final lecture at the Collège de France to the subject of science, because he believed that the "world of science is threatened by serious regression" (vii). He believed that "The autonomy that science had gradually won against the religious, political or even economic powers, and partially at least, against the state bureaucracies which ensured the minimum conditions for its independence, has been greatly weakened" (vii), and that "the boundary, which has long been blurred, between fundamental research, in university laboratories, and applied research, is tending to disappear completely" (vii). While these lines read somewhat naïve in light of the theoretical and empirical advances in STS and the anthropology of science – and it is widely accepted as more productive to think with the dialectical mutually constitutive relationship between the applied and the pure, rather than dwelling on boundaries – these comments nonetheless point toward the changing politics of science. In fact, the way in which the categories of utility are sequestered in pure research and masked by other language genres and pursuits remains part of the indigenous conceit of 'native science.' For this study, the question is how the field of precision medicine I have just outlined masks the potential utility of genomics in state-led population management, and indeed the reification of ethnic and national groups.

How does medical science achieve more than it explicitly sets out to? How does medical science bolster the imagination of the nation through its powerful metaphors of biological relatedness?

Scholars in the social study of science have described the complex ways in which scientific knowledge is influenced by the historical, social, cultural, and political climate that incubates it (See: Abu El-Haj 2001; Bijker *et al*. 1987; Bloor 1991; Daston 2000; Franklin 1995; Jasanoff 2004; Jasanoff *et al.* 1994). This body of scholarship demonstrates that science, an ostensibly universal practice, varies across different nation-states and highlights the ways that the social order and scientific knowledge are co-produced in complex entanglements that cannot be neatly separated into the analytics of pure and applied, or 'nature,' 'culture,' and 'politics' (Cooper 2008; Hogle 1999; Jasanoff 2005; Latour 2004). Moreover, new technologies can give rise to new populations: natural populations and political populations, indeed hybrid biopolitical populations. Novel methods of classifying human populations are emerging in medical research so that in biomedical research, the middle-class, middle-aged white male is no longer the basis for extrapolation of normal biomedical parameters of the wider population. Gender, race, and ethnicity have emerged as important categories in the evaluation of diverse populations. Epstein (2007:17) tells "a story about the politics of how human beings are known, classified, administered, and treated." Today, certain drugs may be more effective in males than they are in females, and different ethnic groups may have a different range of responses to the same drug. For example,

> “In 2005, the U.S. Food and Drug Administration (FDA) licensed a pharmaceutical drug called BiDil for treatment of heart failure in African American patients only. Having failed to demonstrate the drug’s efficacy in the overall population, BiDil’s manufacturers reinvented it as an “ethnic drug” and tested it only on African Americans” (2007:2).

Social identities intersect with medical research and access to appropriate therapies, rendering the right to health a domain of identity politics so that today, “we are witnessing a repudiation of so-called one-size-fits-all medicine in favor of group specificity” (2007:5). These “inclusionary policies are just one link in the chain of biopolitical citizenship that ‘connects discussions of rights, recognitions, and responsibilities to intimate, fundamental concerns about heritable identities, differential embodiment, and an ethics of care’” (Epstein 2007:302, citing Heath *et al.* 2004:157). But even as human and cultural diversity resists unproblematic categorization into ethnic and medical populations, different nations formally engage in distinct forms of scientific reasoning and persuasion with different, but idiomatically particular, understandings of transparency and trustfulness underpinning their practices and rationalities.

Hayden (2003:21), in her study of bioprospecting in Mexico, outlines the way in which modern science embodies interest and human values, and reiterates the core principle of science studies, that “what makes a fact authoritative is not merely its resemblance to ‘nature’ but rather the robustness of the social interests that can be enrolled in its support.” In this reading, “(scientific) knowledge does not simply represent (in the sense of *depict*) ‘nature,’ but it also represents (in the *political sense*) the ‘social interests’ of the people and institutions that have become wrapped up in its production.” In her view (2003:21), “[t]he task for science studies becomes… to identify, uncover, or reveal the interests that are wrapped up in knowledge and artifacts.”

For this study, the interests and logics of states come to the fore, since this study is concerned with ethnonational identity. Jasanoff's (2005) relevant work has used the term "civic epistemologies" to describe the systematic ways that different national cultures engage with scientific knowledge and make decisions in the public sphere, further establishing science as a rich ground for pursuing cultural studies of the state. "Public reasoning" she writes, "achieves its standing by meeting entrenched cultural expectations about how knowledge should be made authoritative" (Jasanoff 2005:249). Science, she contends, even while it is a globalized discourse, must be apprehended in its specific cultural, national, and institutional contexts.

Other work in the social study of science, however, has emphasized 'connections' and 'social values' over epistemology and reasoning, tracking the networks of humans and instruments that produce new knowledge (Latour 2005; Bijker *et al.* 1987). These insights of 'networking' emerged as anthropologists initially began exploring the scientific laboratory as a site of inquiry (Latour and Woolgar 1986; Latour 1987). Before the 1980s, there was a lack of anthropology 'at home,' and especially of modern science. As Latour and Woolgar (1986:17) put it:

> "Since the turn of the century, scores of men and women have penetrated deep forests, lived in hostile climates, and weathered hostility, boredom, and disease in order to gather the remnants of so-called primitive societies. By contrast to the frequency of these anthropological excursions, relatively few attempts have been made to penetrate the intimacy of life among tribes which are much nearer at hand."

The new anthropology of science that they sought to develop would not follow in the functionalist tradition and "specify norms governing scientists' behavior" (Latour and Woolgar 1986:32). Moreover, they would attempt to sidestep the distinction between "'social' and 'technical' issues, however closely related these might be said to be" (1986:32). As an experiment itself in a new site of ethnographic inquiry, Latour and Woolgar recorded the daily life practices of a biology research laboratory at the Salk Institute in San Diego.

They reported on the daily conversations, the writing of internal reports and experimental results, as well as the so-called 'purified' products of the research, which emerge as research articles for wider dissemination. They borrowed metaphors from biology practices, such as 'purification,' to describe the epistemic practices of the laboratory and how epistemic outputs are disentangled from their social history in messy human-machine networks. Their purpose was to elucidate in a constructivist register the internal laboratory practices that contribute to the 'construction' of new facts, sometimes entailing new objects, and not to challenge the validity of the epistemic outputs of the laboratory. Rather, the purpose was to problematize, philosophically, the separation, indeed purification, of fact from value in modern science. Latour (2004:10) continued with this theme in his work, and he later defines science as "*the politicization of the sciences through epistemology in order to render ordinary political life impotent through the threat of an incontestable nature*."

For Latour, in modern societies, epistemology is routinely pitted against politics, humiliating politics into submission, and masking the political nature and interests of the truth bearers. These insights have since become the taken-for-granted operating assumptions of STS.

Scholarship in the history of science has similarly moved to embrace an 'anti-epistemological' mode of inquiry, investigating the basis of knowing reality by showing that scientific objects can be meaningfully read as being both partially real and historically produced at the same time, evading a constructivist/realist split (See Hacking 2002, 2000). Daston (2000:1) terms this an “applied metaphysics” approach, advocating the analysis of scientific objects in their historical and political context of production and circulation. She writes (2000:1):

> “[i]f pure metaphysics treats the ethereal world of what is always and everywhere from a God’s-eye-viewpoint, then applied metaphysics studies the dynamic world of what emerges and disappears from the horizon of working scientists.”

Anthropologist Marks (2013) recently mobilized a similar viewpoint in relation to the natural facts of race, saying “race” has been

> “genetically real when geneticists who believe it is real brandish their particular genetic data and statistical analysis, and it is unreal when geneticists who do not believe it is real brandish their genetic data and statistical analysis.”

Anthropologists of science can benefit from these critical insights from the history of science and STS when attending to the social life of science and technology. Many works in the social study of science have tended to bracket the epistemological issues (such as the relation between ethnic or national context and what counts as true or valuable knowledge) in favor of a global political economic reading that emphasizes inequality, identity politics, lack of access to healthcare, or indeed overmedication of populations (Cooper 2008; Dumit 2012; Franklin 2007; Greene 2014; Reardon 2004, 2011; Sunder Rajan 2006). Such works have appropriately addressed the logics of the global market for their overdetermination of the life sciences in the 21st-century. Broadly speaking, this body of work traces how since the 1980s there have been significant developments in molecular biology (gene cloning, the human genome project, and the development of biological therapeutics, for example), and that this period also witnessed the advent of neoliberal policies, entailing the recession of the state and the dominance of the market in public services and scientific development itself.

This confluence of events has overdetermined the field of the biosciences; it has set the stage to usher in a regime of valuation that hinges on the promissory value of "life itself" (Cooper 2008:3; Fortun 2008) in capitalistic terms. In thinking about the interrelationship of the market economy, as it engulfs the biosciences, and the field of the modern life sciences, Cooper (2008:5) follows from Michel Foucault, contending that the "development of the modern life sciences and classical political economy should be understood as parallel and mutually constitutive events." In this regard, the biosciences may also be read as a manifestation of the logics of global capital, even while their epistemologies explicitly address issues of life and 'basic' 'natural' science. In this vein, Dumit's (2012) work on the political economy of pharmaceuticals points to an emergent medical logic whereby the absence of symptoms no longer defines health. He argues that with the marketization of commercial pharmaceuticals, and a research industry that is seeking to determine risk factors that indicate the likelihood of developing a disease later, populations are being encouraged to be prescribed drugs years in advance of potentially developing a disease. He chronicles the way "the very concept of a risk actor was created alongside the innovation of large-scale prospective clinical studies" (2012:4). In his constructivist view (2012:13), "[n]either health nor illness are states of being: they are states of knowledge; they are epistemic."

This dissertation, by distinction, does not dwell extensively on the political economy of the global life sciences but instead aims to bridge anthropology, Middle

Eastern Studies, and the social study of science, and asks how and why genomics and biobanking are becoming key sites for imagining the national and ethnic communities in the contemporary Middle East. For this work, the transnational context is, of course, pertinent, and the way the contemporary biosciences reconfigure identities is crucial. As Dumit states (2012:16), in contemporary biomedicine, "[r]isk is now a subjective present illness: treated as if diseased." This fact is essential to understanding the logics underpinning national biobanking and the value they hope to capture. The focus of this study, however, is on ethnic and national identity. This inquiry lies orthogonal to the question as to whether ethnic groups are naturally real, imagined, or constructed, but instead concerns the conditions of the genomic and biobanking practices that render these imaginations of collectivity important today. I ask: what is the role of recent history, demographic issues, national politics, and global trends in biological science, in overdetermining the ways in which ethnicity is attended to? And how the ethnic context unfolds as a structuring force in basic scientific research? This line of thought is at its core a deferral, or displacement, of ontology, in this case with ethnic genetics, and it resonates with an immanent critique of the natural facts of race and ethnicity.

The Molecularization of Ethnicity

Ethnicity has previously been theorized across both 'primordial,' cultural identitarian terms and 'instrumental' terms. While the former presupposes a deep and shared historical experience amongst members of the ethnic group, by distinction an instrumental analysis treats ethnicity as a process of identification, as merely a strategy to extract rights and resources (Barak 2002). Comaroff and Comaroff (2009) have described how in late capitalism elective ethnic identification is caught up in the logics of the global market, with ethnicity more and more appearing as a marketable commodity, or a claim to rights to extract value from a national heritage. Ethnicity has become closely inflected by the logic of global capital. Ancestral claims, authentic belonging, tourism, the commodification of culture, and also techniques of governmentality and nationalist political rhetoric have all been entangled with claims of authentic ethnic identity.

Simultaneously, claims of ethnicity have also moved into the molecular realm (Abu El-Haj 2007a; Fullwiley 2008), and the politics at stake in the new discourse of genetic claims to race and ethnicity have been debated, particularly with regards to the reinscription of older racial categories. Genetic claims to history often rest on a "divinatory logic" that seeks out invisible essences **(**Palmié 2007), to the point that "postgenomics [*is*]…..giving race a new lease on life" (Abu El-Haj 2007b). However, the difference with genomic definitions of race, when compared to 19th-century biological and physiological measurements, is that "junk DNA" that may have no physical expression or biological effect is now being used to mark racial divisions (Abu El-Haj 2007b). It would seem that the political imaginaries of the present engender the immaterial 'new genetics' a possible and, indeed, a preferred, source of data for historical and racial mapping. How this is beginning to matter in the contemporary Middle East is not yet clear, however. In any event, the 'nature' of race may appear to follow as an epiphenomenon of the politics of the present. As Comaroff and Comaroff state (1992:51) "it is the *marking* of relations—of identities in opposition to one another—that is 'primordial,' not the substance of those identities." This proposition underpins my thesis that the context of ethnonationalism lays the ground for the way in which ethnicity is becoming attended to in the molecular realm, and importantly displaces the essence of race in favor of the conditions of the mediations of the ontological claims of identities, such as race, nation, or ethnicity.

This issue has been analyzed at length by anthropologist Nadia Abu El-Haj in her 2012 work *The Genealogical Science*, which focuses on the field of 'genetic history' as it pertains to Jewish origins. Abu El-Haj shows how databases that emerged from the human genome project were used to render accounts of the origins of contemporary populations and to evaluate the plausibility of oral traditions and historical narratives. Genetic narratives have gained credibility as these data are wielded academically to describe the origins of ethnic groups. Further, an emergent market in recreational genetic ancestry testing has bolstered the narrative potential of genetics in relation to ethnic identity.

She calls this phenomenon the field of 'anthropological genetics.' Fundamentally, the field of anthropological genetics studies "human origins and migration routes out of Africa" and "the genetic diversity of the human species" and maps "genealogies of particular populations" (2012:3). Her work traces how anthropological genetics has emerged from "race science, circa 1900, that relied on cranial measurements and phenotypic differences; population genetics, circa 1950, based primarily on blood group data" preparing the ground for "genetic history, starting in the 1900s, which examined genetic differences at the level of the nucleotide, focusing on mitochondrial DNA and the Y-chromosome" (2012:4).

Specifically, in relation to genetics of Jewish populations in the State of Israel, she analyzes "the work of Israeli population genetics in the 1950s and 1960s in the newly founded nation-state," and she reads "this work as expressing a desire—indeed, a *need*—to find a 'content' for the a priori nationalist belief in the fact of Jewish peoplehood." Crucial to this analysis is the possibility of revealing a Jewish "common origin in ancient Palestine." (2012:4) This, she argues (2012:5), is a timely moment in which genetic sciences have considerable rhetorical power, since "with the technological developments, the scientific and social reach, and the epistemological authority of genomics in the contemporary world, since the mid 1990s such efforts have been given a renewed, in fact reinvigorated, lease of life." She tracks these scientific developments in relation to the broader social and political context. In her own words the book

> "inspired by a tradition in the history, philosophy, and sociology of science, I pay careful attention to scientific epistemologies, past and present. But I read scientific epistemology via an anthropological sensibility trained to understand not just the epistemological, social, and political conditions of possibility of scientific work" (2012:7).

Following scientific developments in the 1980s, she shows how population genetics entered a new era, "as knowledge of mitochondrial DNA (which is only passed down the maternal line) grew, allowing a greater understanding of genetic evolution, migration, and genealogy" (2012:8). These developments have rendered DNA as "a historical document" (2012:11) such that "the anthropological gene and genome are molecular archives" (2012:2) But these developments occurred at a new moment in terms of the politics of race, or eugenic undertones of race science: "Whereas for race science, biological difference was taken to *cause* cultural and cognitive differences, in anthropological genetics that causal logic is absent" (2012:22). DNA, as it associates with ethnic groups, is no longer being tracked for phenotypic differences or to explain different behavior. Rather, DNA is becoming read merely as “indexes of ancestry and origins” (2012:22).

This application of genetics makes use of non-coding DNA, which may not have an essential biological role at all. But non-coding DNA is nonetheless useful. Such non-coding DNA markers, “precisely because they have no biological function,” are “argued to be significant forms of evidence for efforts to reconstruct ‘origins’ or ‘the past’” (2012:22). As objects for group making, DNA markers, “do two things at the same time: they differentiate groups and, simultaneously, make no difference at all” (2012:23). In this application, anthropological genetics is more than ‘biological citizenship’ or biological connectedness between members of an ethnic group, but it also engenders efforts “to identify a history within” (2012:28). Abu El-Haj is cautious to emphasize the distinction between descent and identity in anthropological genetics: “Descent from a common ancestor does not imply identity. Rather, it implies a presumably decipherable matrix of genealogical relationships ‘visible’ in genetic polymorphisms” (2012:38). In other words, descent has become a statistical phenomenon, that is molded in specific social and historical contexts, and that creates the conditions that impose value on genetic readings that reveal historical truths.

Indeed, in Israel, she shows that the genetic research of Israeli populations that followed the foundation of the state “a practice wedded to the work of *imagining* the nation” (2012:64). The question of what evidence is there that “the Jews are a nation with a shared origin in ancient Palestine” gained “urgency in the early state period” (2012:64). Ethnic categories assumed within the Israeli population played out in the work of geneticists on blood groups in the early state years. She finds that “[t]he classificatory categories ‘Ashkenazi’ and ‘Sephardi’ were black-boxed in the very design of the studies” and that “[t]hose categories were assumed a priori to exist.” The scientific research of the time took for granted the existence of difference, and thus “reiterated the biological truth that the Ashkenazim and the Sephardim are identifiable populations, which can, in principle, be compared with other presumably equivalent populations—Jews of Cochin, of Yemen, of Baghdad, and so forth” (2012:93).

Genetics research in Israel not only addressed a shared genetic archive amongst Jewry, but it also reiterated assumed ethnic distinctions within the Israeli population. In other words, there is a tight dialectic of context and choice at play in biological iterations of Jewish identity in Israel. Or as Comaroff and Comaroff would put it (1992:60), “while ethnicity is the product of specific historical processes, it tends to take on the ‘natural’ appearance of an autonomous force, a ‘principle’ capable of determining the course of social life.” How collective identity determines social life hinges, however, on the mediation of the imagination of wider collectivity, indeed, upon the imagination of the nation.

Imagining the Nation

Anderson’s (1983) classic historical reconstruction of the origins of modern nationalism identifies the basis of national collectives in the shared imaginations of individuals as co-present members of a jointly imagined nation-state. Technologies, such as newsprint media, are essential in maintaining these collectively shared imaginations and their entailed performances. Anthropologist Appadurai (1990) extended Anderson’s (1983) notion of imaginaries to describe the transnational flows of a globalized, technologically advanced, and interconnected, world. He characterizes such modern spaces by their jarring “disjunctions,” junctions where difference is encountered and where homogeneity is challenged. He splits such ‘global flows’ into five dimensions, termed: ethnoscapes; mediascapes; technoscapes; finanscapes; and ideoscapes. With these *categories* that widen the critical range of how assembled collectivities imagine their existence, Appadurai puts forth as a name ‘*Imagined Worlds*,’ drawing on Anderson (1983), but providing a more ‘schismatic’ and ‘non-linear’ program for mapping the semiotic flows that constitute the multiplicities of these very real but also, of course, *imagined,* worlds.

Appadurai’s intervention also allows us to think more broadly about communities in a multidimensional way, as material, image, practice, aesthetics, or as worlds of abstract ideas. Such contemplation about the diverse kinds of mediations that hold worlds together is particularly amenable to a reading of science and technology as semiotic mediators of collective identities. Science and technology can likewise be read to play a role in reinforcing the imagination of a shared national community, or indeed a global scientific community. Jasanoff and Kim (2013), for example, have extended these insights and provided a theoretical framework for understanding the global politics of science and technology that builds on this literature of imaginaries and their relationship to global flows and circulation. They define “sociotechnical imaginaries” as “imagined forms of social life and social order that center on the development or fulfillment of innovative scientific and/or technological projects.” The concept of sociotechnical imaginaries demands asking how ethical, social, and political commitments are built into national visions of technoscientific development and also how science and technology are used by people to imagine their citizenship, identity, and participation in public life.

This dissertation follows this field of theory and draws on the frame of “sociotechnical imaginaries” (Jasanoff and Kim 2013, 2015) to lend interpretive power to an analysis of the role of genetics in the stabilization of the category of ‘ethnic genes,’ tracing the connections between legal citizenship, genetic research of ethnic populations, participation in biobanking projects, and the political imaginary of the nation-state as bearing an intrinsic ethnic essence. This line of inquiry inevitably leads to questions about space and territory and the ways in which they are lent symbolic meaning, crystallized in an institutional setting, and sustained. Unlike newsprint media, or television, biobanks collect literal shared substance of individuals (blood, DNA, urine, or other tissue samples) in the population, and consequently open up a range of possibilities for measuring, cataloging, controlling, imagining, and generating populations, and indeed sub-populations, also entailing a range of medical implications and future treatment possibilities.

Biological substance becomes not only a way to imagine a shared community, but also a way to arrange or assemble in contiguity the shared substance and health of the imagined community, and simultaneously, as we will see, modulate how lives are lived. But ethnic genetics can also be a site of control of the population.

Modern nations typically imagine a past that establishes the grounds for a shared sense of community. Communities draw on narratives and images that bolster the claim of shared experience, substance, or national essence. At moments of crisis or emergence, such imaginations of collective identity take great hold. In the Middle East – a region fraught with ethnic and identitarian divides – this process is particularly prominent.

In Israel, reinventions were at work in the early Israeli statehood years, which Abu El-Haj (2001:6) calls "colonial knowledge," reading archaeology as a political project put in the service of reformulating a national people in the context of settler colonialism. She argues (2001:16) that "[t]here emerged, in other words, an elective affinity between archaeology's epistemological and methodological commitments and the cultural politics of the Jewish colonial nation-state-building project as both crystallized in early-to-mid twentieth century Palestine." On the creation of the new Jewish state, historian of Zionism Zerubavel states that "[t]he construction of a myth of origins requires the twofold strategy of emphasizing a new beginning as well as discontinuity with an earlier past" (1995:43), which is to say that the self-fashioning of Israeli-ness involved a redefinition of a Jewish self, a breach with history, and with that a resurrection of a new history that would root Israelis to the land of Israel.

The labor Zionists that dominated the culture of the young state emphasized vigorous physical labor as the basis of a new 'Hebrew culture,' and gave rise to the spread of the so-called 'Sabra' culture amongst the first generation of Israelis. The 'Sabra,' a new Israeli type, was thought to be tough on the outside and sweet on the inside, according to the common trope that Almog (2000) documents as akin to a kind of new "secular national religion." In this instance, the body was an important site for performing and imagining the new Hebrew citizen. From the early years of the Israeli state, a fervent anti-diaspora sentiment was rigidly codified into an idealized image of a male Zionist pioneer, imagined as a warrior and a worker, an assiduous and productive member of a healthy society. This ideal is constructed in hyperbolic opposition to the stereotype of diaspora Jews, who were by distinction perceived by the first Israelis as feeble, effeminate, and even morbid. The virtual ideal of the Sabra, however, preferred the life of action to the values of scholarship and intellectualism, and he was always willing to sacrifice his individual desires for the greater good of the nation. Katriel's (2004) ethnography of language in Israel and specifically her focus on speech as a site of authenticity in the creation of the 'New Hebrew culture' is crucial here. She (2004:18) writes:

> "there were two major versions of it: one was the neo-Romantic version inspired by the German youth culture of the turn of the twentieth century and its individualist-humanist ethos, which sought to attain personal redemption through the re-creation of an organic-national community…. The other version of the New Jew was influenced by Russian pre-revolutionary movements that preached the return to nature and to the simple life via menial, productive work" (2004:19).

Such national imaginaries, and the values that their performances propagate, also play out powerfully in science and medicine. Israeli anthropologist of medicine Meira Weiss (2004) has described the legacy of the Sabra culture of the first generation of Israelis in obstetric medicine, saying that a majority of Israelis "agree that giving birth to a child with a serious impairment is socially wrong" while in contrast "geneticists around the world usually regard the decision to abort a deformed fetus as primarily personal" (Weiss 2004:3). But science was not only a reflection of widely shared cultural values. Large-scale scientific projects also inculcate a new imagination of territory and belonging.

The Israeli state drew on basic engineering and agricultural projects to establish the imagination of a progressive state project. The land of Israel became territorialized through the material-semiotic electrification of Palestine by the marking of the landscape with electricity poles (Shamir 2013). Shamir reads the historical electrification as a political matter; not simply a consequence of community building, but a constitutive element of nation-building. A confluence of private capital, technical knowledge, and imaginations of progress resulted in an infrastructural development that entailed a widening of the divide between Jews and Arabs. He argues that

> "electrical connections participate in processes of group formation, take an active part in the performativity of social asymmetries; shape areas and regions and other spatial formations; and actively assemble, sustain, and enable taken-for-granted categories and dichotomies such as the private and public spheres" (2013:3)

In this reading, "electrification—specifically, the concrete material infrastructure that enables it—deploys numerous mediators" (2013:6) This reading foregrounds the role of the material infrastructural fabric over the agents who have invested the project with support and interest. The purpose of this move "is to track down a process of electrification under the auspices of a colonial government and show how it produced and affirmed ethno-national distinctions" (2013:9).

Similarly, Braverman (2014) describes how the widespread planting of pine trees, which symbolized the Zionist emphasis on healthy growth and agriculture, helped territorialize the land of Israel/Palestine. But today, agriculture is a smaller part of Israel's economy and national self-image. The country has moved into a globalized phase, and this has also produced a new cultural fabric to be understood at the level of global capital. Crucially, however, this move to globalization is also entangled with Israel's national identity.

Ram (2008) gives an account of the recent globalization of Israel and offers a new paradigm for understanding the cultural shifts taking place in the country. He posits an analysis of Israel as being “bifurcated into two polar opposites—capitalism versus tribalism, or “McWorld versus ‘Jihad’—that contradict and abet each other dialectically” (vii), borrowing the idiom originally coined by Barber (1992). Israel has experienced progressive high-tech globalization since the 1990s, and Ram uses a Hegelian approach to read this specific process of globalization as a “contradictory dynamic totality that conjoins these two negations: ‘McWorld’ versus ‘Jihad’” (2008:2). These metaphorical terms caricature a process in Israeli society, “[a] dialectical struggle between a global, capitalist, civic trend and a local nationalistic religious trend” (2008:6). In Israel, globalization is characterized by a tension between the global and the local. In his reading, the process of globalization can lift local processes out of the immediate spatial environment and render them part of an unmarked, delocalized, global order, entailing new markets, new types of actors, new rules and norms, and new strategies of communication (2008:13). Ram sees this process of globalization as “the new stage of capitalism in the intersection of the twentieth and twenty-first centuries” (2008:17). This process, however, poses a challenge to Zionism, with “two opposite perspectives: a postnationalist perspective, which tilts toward global cosmopolitanism, and a neonationalist perspective, which tilts towards local tribalism” (2008:26).

This dynamic is giving rise to a cosmopolitan post-Zionist culture in Tel Aviv, which is the center of an emergent ‘creative class’ of skilled middle-class workers in the arts, music, science, high technology, and medical research. Ram also sketches three waves of popular culture that have unfolded in the history of modern Israel. The “first wave began in the 1930s and ended in 1977.” It was “characterized by the unilateral hegemony of… the Labour movement” (2008:153). “The second phase began with the electoral upheaval (Mahapach) of 1977, which deposed Labour for the first time in the country's history from the governing role" (2008:153). This event marked the negation of the monolithic statist Labour party of Ben Gurion that was perceived to favor the European Ashkenazi population over Jews of Middle Eastern backgrounds, or indeed Arabs. The victory of the right-leaning Likud party led to a new right-versus-left political dynamic in the country. The right has been represented by a variety of parties,

> "including the national-religious party (Mafdal) and the Likud Party and at different points in time other—religious and secular—extreme right-wing parties, such as Tozemt (Juncture), Moledet (Homeland), or Israel Beiteinu (Israel Our Home), and in a somewhat different version also the Shas party" (2008:231).

Such right-wing parties incorporate a Jewish national-religious platform while also allowing progressive 'marketization' of public services and deregulation of the financial market, thus enabling globalization of the Israeli economy.

The third phase in popular culture, however, began in the 1990s, characterizable by: "the two-edged feature of postmodern Americanized politics: communalism and commercialism" (2008:153). This historical evolution poses two contradictory propositions for the future of the state: "transmute into an ethnic Jewish state or to transmute into a liberal state of its citizens" (2008:237). Which turn the society will take is not yet clear, but Ram contends that "since the 1990s Israel has become simultaneously more of a market society and more of a tribal society, more neoliberal and more neofundamentalist, more post-Zionist and more neo-Zionist" (2008:238). In this taking, the state appears to be able to contain the two sides of the dialectic of 'McWorld' and 'Jihad' that Ram has described. Part of this dissertation asks how the Israeli 'national biobank' fits with or breaks with these accounts of nation-building, globalization, and the imagination of a shared bodily essence or practice. The imagination of genetic peoplehood has implications, of course, for the way states may manage their populations.

Biopolitics and Citizenship

Michel Foucault (2010) used the term “biopolitics” to describe the way in which modern democratic states manage, and imagine, their populations at the level of life itself. The prospect of national biobanking projects raises the question of the reinscription of ethnic essentialisms. This also demands consideration of whether this could engender a project of biopower that could foster a new regime of biopolitics at the level of individuals’ genes, with potential for governments cataloging the ‘biological citizen’ (Petryna 2013) at the molecular level. In considering the potentiality of genotyping citizenship then, it may be helpful to ask if such potential developments are attempts by states to imagine a stable national collective. An emerging anthropological literature is investigating the various ways in which citizenship is enacted, performed, imagined, and challenged, particularly in relation to transnationality and migration (Chu 2010; Lazar 2013; Ong 1999; Petryna 2013).

With the global reach and extensive context of late capitalism, the concomitant consolidation of the hegemony of neoliberal market logics is impinging on older notions of static, stable, fixed ethnonational allegiances. A global market, it is understood, needs a workforce that can travel, migrate, and relocate to where the jobs are. Ong’s (1999) work, for example, has described “flexible citizenship” as the way in which elite Asian migrants have imagined their adaptation to the global flows and displacements of capital, configuring a dynamic and reactive regime of displacedness, cultural adaptability, and mobility. In relation to neoliberal logics impinging on ethnic belonging in the Middle East, work by Kanna (2010, 2009) has likewise described “flexible citizenship” amongst Emirati businesspeople in Dubai, with older tribal kinship genealogies being circumvented, or effaced, by the global logics of mobility, deracinated worldliness, and cultural porosity. Similarly, Longva (1997) describes the heavy imbalance of the population and the central role of a migrant workforce in Kuwait. Less focus has been put on the way in which the citizens as a minority maintain an ethnic identity and sense of groupness amidst the high number of expatriate migrant workers.

In the Israeli or Qatari context, it is not yet clear whether or how such neoliberal market logics are affecting configurations of nationality and relationships to the territory. On the contrary, a recent study argued that in Israel “conversion” to Judaism had a powerful “stabilising” effect for the individual (particularly recent immigrants), by making the convert part of the ethnonational fabric and marking them as an incorporated internal citizen (Kravel-Tovi 2015). Whether either “flexible” or “inflexible” citizenship are appropriate idioms for characterizing the Israeli context has yet to be determined. It is also not clear whether Qatari elites have adopted similar attitudes towards migration, and if they have, like Emiratis, reconfigured their relation towards global citizenry, or if the Qatari national affinity is strengthening. Furthermore, it is not yet clear how neoliberal logics of unregulated markets and mobile workforces are played through the lens of genetics and technoscience to refract or transform the local underlying cultural logics of citizenship, modes of performing belonging, and ways of negotiating distance and incorporation in the state. It is likewise not clear whether biobanking developments in

Qatar are challenging traditional idioms of tribal allegiance, or if they are contributing to a biological understanding of historical connectedness with other Qataris.

Dissertation Aims

This dissertation will follow a line of philosophical anthropological inquiry, and impose an "immanent critique" on the problem of the molecularization of ethnicity in the context of the Middle Eastern ethnonation, specifically in Israel and Qatar, and in the context of late capitalism. The thrust of this research is an attempt to interrogate how, and why, bioscience can fit with or reshape prior ontological arrangements and political imaginaries, revealing how this impacts on society, and how the state attempts to understand itself in the political present through technoscience. This research is at its core concerned with tracking the entanglements of politics, science, and nature as they are co-produced and articulated on the plane of the nation-state (Jasanoff 2004, 2011; Latour 2004), but it likewise speaks to the anthropology of belonging (Crowley 1999; Kravel-Tovi 2015; Yuval-Davis 2006); to the anthropology of science (Dumit 2012; Franklin 2007; Napier 2003); to science and technology studies (Abu El-Haj 2001, 2007a, 2007b; Cooper 2008; Jasanoff 2011, 2004; Sunder Rajan 2006); to the anthropology of science and state building in in the Middle East (Abu El-Haj 2012, 2001; Inhorn 2015) and particularly the Gulf region (Fox *et al.* 2006; Kanna 2010, 2009). First, however, a word on the context of nationalism, and the ontological status of a shared community as it is pursued in this critical reading.

I should clarify that the thrust of this research is *not* to ascertain whether the genetic 'molecularization of ethnicity' is valid or invalid, or true or false on some meta epistemological level, *per se*. On the contrary, I aim to expose the cultural and natural determinants that hybridize to render biological articulations of ethnicity powerful and meaningful in the political present. I thus ask how and why ethnicity is being reconfigured within the molecular realm. While the concept of the medicalized body (Franklin and Lock 2003; Hogle 1999; Teman 2010; Weiss 2004) or the racialized type (Seeman 2010; Wailoo *et al.* 2012) might function quite differently across the various Middle Eastern sites and national contexts, a comparative project studying ethnonationalism in relation to heavily funded biological research can nevertheless reveal similar underlying determining factors.

For example, the growth of ethnic science gains particular utility in a precise context, and its popular reception may be buttressed by the perception of a national identity under threat by foreign migration, by the sudden adoption of modern lifestyle practices, by divisions between secular and religious identities; internal demographic pressures, and by tensions between new immigrants and older elites. Further, the proliferation of ethnic 'biomarkers' can be enhanced and valuated by the particular state-citizen relations in the Gulf 'rentier' states, where citizens, often a demographic minority, benefit greatly from spontaneous state support. Indeed, in both the UAE and Qatar, nationals constitute approximately 13% of the population.[11] This hypothetical contingent national or ethnic identification would accord with Barth's (1998[1969]:36) conception of ethnicity as a 'plastic' boundary-making practice subject to reorientation depending on

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[11] CIA World Factbook, United Arab Emirates, accessed Feb 28 2018, https://www.cia.gov/library/publications/the-world-factbook/geos/ae.html
Population of Qatar by nationality, accessed Nov 22 2015, at http://www.bq-magazine.com/economy/2013/12/population-qatar
CIA World Factbook, Qatar, accessed Feb 28 2018, https://www.cia.gov/library/publications/the-world-factbook/geos/qa.html

what resources are at stake. This research, and this line of thinking, will therefore also be relevant to a growing literature on the relationships between scientific practice, 'natural' identity, migration, and citizenship (Butenschon 2000; Carson 2002; Longva 1997, 2000; Lori 2012; Lazar 2013; Napier 2003; Ong 1999; Petryna 2013; Subramanian 2015). This study also considers the global context of biomedicine in this post-genomic moment of medical-genetic risk, with the progression towards personalized and predictive medicine (Dumit 2012; Sunder Rajan 2006). And finally, this work will also make a contribution to contemporary conversations in anthropological theory as they speak to biopower, national development, and transnational medical anthropology (Abu El-Haj 2012, 2007a; Jasanoff 2011, 2005, 2004; Ong and Chen 2010; Prainsack 2006; Rabinow 1999, 1996; Reardon 2011, 2004; Rose 2007).

Methodology

Participant observation has been used as an ethnographic method by anthropologists since at least the 1920s and has been sustained as a central method of inquiry in the discipline since then (Helmreich 2007). More specifically, participant observation has been used to do "symmetrical anthropology" and study scientists ('studying up' is a turn of phrase often used, as opposed to studying native, traditional, societies) in laboratories (Latour and Woolgar 1986). Its strength lies in is the qualitative penetration of the site studied, allowing the researcher to gain an intimate understanding of the culture from within. I was well prepared to do this particular line of research, having had training in biochemistry, cell biology, biophysics, and neuroscience. The professional identity that this training afforded facilitated smooth integration with the scientists as a collaborator, and therefore, also, a participant observer in the laboratories at Tel Aviv University and at scientific institutions and conferences in Doha. I already knew how to speak like a native, the dominant field language being the language of science.

This dissertation project emerges from a one-year participant-based ethnography of the National Laboratory for the Genetics of Israeli Populations combined with two research trips to Qatar totaling about five weeks. In Qatar, I attended two annual functional genomics conferences, where I had several conversations with leading researchers and clinicians working in genomic medicine in the Gulf region. In Israel I worked in a genetics laboratory in the Sackler School of Medicine at Tel Aviv University as a scientist and ethnographer, attending to how genetic readings relate to the cataloging of ethnic identities. Research in Qatar was completed by attending two functional genomics conferences, documentary analysis, targeted interviews, visits to key institutions, and conversations with clinicians and scientists in Doha. This research also draws heavily on published documents and reports from the National Laboratory for the Genetics of Israeli Populations, from Sidra Medical Center in Doha, from the Qatar Biobank, and from the Qatar Genome project.

Overview of Chapters

This dissertation compares the ‘molecularization of ethnicity’ in Israel and Qatar. In chapter 2, I discuss the origins of biological understandings of Jewishness, especially in relation to the prefiguring intellectual history of Zionism and Jewish political thought, and the possibility of a novel application of genetics in distributing citizenship. In chapter

3, I present my findings from my ethnographic work at the National Laboratory for the Genetics of Israeli Populations, and I examine the origins, motivations, and aspirations of the Israeli National Biobank, asking what kind of moral community the biobank mediates. Following this, in chapter 4 I discuss the Qatar National Biobank and developments in genetic medicine in Qatar, and I analyze the relationship between the Qatari biobank and the context of an emerging Qatari nationalism. Finally, I conclude with a summary comparison of the Israeli and Qatari national biobanks, and I discuss the relevance of these findings to contribute to the social theory of science and technology.

The ‘Nature’ of Israeli Citizenship

In 2013 the State of Israel announced that it might begin to use genetic tests to determine whether some prospective immigrants are Jewish or not. If implemented, the state would be enshrining Jewishness at the level of DNA, rendering 'Jewish genes' legally legible, and making DNA signatures a basis for decisions on rights to citizenship. Despite this claim, there is no 'Jewish gene,' or any unequivocal genetic test for Jewishness. Regardless of this shortcoming, the imagination of 'genetic citizenship' circulates widely in Israeli society. This chapter, written in the genre of historical anthropology, situates the contemporary context of 'Jewish genetics' within the diverse political philosophy of Zionism, particularly as it relates to configurations of Jewish ethnicity and modes of imagining citizenship. I discuss this potential biopolitical regulatory technique in the Israeli context, and I highlight the implications for citizenship law and defining the limits of belonging in the Jewish nation.

Gene Talk

Yashka is a cheap shawarma joint perched on the corner of Dizengoff and Frishman, the urban heart of Tel Aviv. Since I didn't have a proper kitchen in my small one-bedroom apartment, I would often stroll down to Yashka to enjoy a lunch of falafel, shawarma, or shakshuka. Also, I liked sitting there, observing people, and noticing the rotating staff of new Russian *olim* (Jewish immigrants to Israel). One winter afternoon I wandered in, bought a heavy shawarma wrap, and after filling a small bowl with the complimentary pickles and tahini, I sat down in one of the green plastic chairs opposite a man of around my age. After a few minutes of eating silently in each other's company, he asked, in Hebrew, if I had seen the football match. When I said no I hadn't, he asked where I was from, and we began small talk. He was surprised that I knew Hebrew and asked what I was doing there. I said "research," and after a moment of silence, I elaborated: "I'm studying the way in which genetics relates to Jewish identity, for example how the government might use genetic tests to determine who can immigrate to Israel." He raised a finger and said that he knew about this topic. He has been following the philanthropic efforts of a "big Israeli businessman" who wants to fund research in genetics to show that the Arabs in Israel were Jews who converted to Islam in the past and that consequently, this would prove that "the occupation is bullshit." He proceeded to proudly tell me that he is a "right-winger" and that he was pleased with the recent news scandal: a 'sting operation' in which a right-wing activist (from the *Ad Kan* organization) infiltrated a left-wing human rights NGO that was attempting to expose human rights abuses in the West Bank. In his opinion, the land belongs to the Jews, and the use of genetics to support those claims ought to align with his political views.

I was intrigued by the way in which he saw no need to separate politics from epistemology. For him, it was a clear question of orientation, support, and brute force. Truth did not stand before politics but followed conviction. Politics rules over epistemology, in essence. The absence of the epistemic and professional ideal of objectivity didn't even seem an issue for him. Rather, genetics ought to be used as a rhetorical device to undermine the rights of the Arabs in the region and justify the occupation of the West Bank. In this formulation, the modern separation of fact and value is irrelevant. Politics in this instance was driven by commitment and action, not by putatively disinterested epistemics.

This man's stance on the use of genetics in political action speaks to the way in which genetics has infiltrated the Israeli popular imagination as a powerful tool in establishing, policing, imagining, and defending boundaries, identities, and territory. But 'gene talk' is not limited to the nationalistic clientele of cheap street food in Tel Aviv.

In July 2013 Israel's Prime Minister's Office stated that in the future Russians wishing to make *aliya* (immigrate) to Israel might need to take a DNA test to prove their Jewishness (Zeiger 2013). While this statement was meant to indicate that the state would use genetic tests to verify a legitimate 'biological connection' with a Jewish parent or grandparent, Jewish religious authorities might not necessarily recognize a genetic measure of kinship to establish transmission of Jewish identity. If this is implemented, the Israeli state would be enshrining Jewishness at the level of DNA, rendering 'Jewish genes' legally legible, and making DNA signatures a determinant of basic rights and citizenship for the first time in Israel's history. In this chapter, I discuss the legal nature of citizenship in Israel and introduce 'Jewish genetics' as a discursive field in which the imaginations of citizenship and belonging are now situated. First a note on the context of the Israeli state.

The State of Israel is explicit in defining itself as the homeland of the Jewish people and is thus both ethnoreligious and national in its self-image. The commitment to the Jewish character of the state, however, raises perennial domestic concerns, and frequent moral panics, over who is a Jew, how this can be determined, by what credible authority, and what exactly the 'nature' or fundamental modality of citizenship is in

Israel. A genetic test for Jewishness is thus valuated in this context and would serve by functioning as an objective metric of legitimate inclusion in the state, constructing a virtual biological border, and providing an unequivocal substrate for calculating ethnic belonging.

Although it is unlikely that genetic tests for Jewishness will become the main criterion for securing Israeli citizenship, the rise of 'Jewish genetics,' and its circulatory semiotics, exemplified most loudly by the state's announcement (Zeiger 2013), demands an examination of the curious relationship between biology, Jewish identity, and citizenship in Israel. In this chapter I discuss the basis of this novel and particular form of governmentality, the management of citizens and populations through 'ethnic genetics,' and I situate this contingent historical moment as it relates to the political philosophy of Zionism, particularly regarding conceptions of Jewish ethnicity. This line of thought is a historical anthropology of a concept, with a reading that imposes an immanent critique on the phenomenon of the molecularization of ethnicity in the context of the Jewish ethnonation. To follow the Frankfurt School of Critical Theory, I attempt to breach between ideas and reality, and "confront the existent in its historical context, with the claim of its conceptual principles, in order to criticize the relationship between the two and thus transcend them" (Held 1980:183). By transcending the particularity of this relationship, this chapter aims to speak more generally to the relationship between science and ethnic identity. In another regard, this is also a brief intellectual history of the concept of Jewish ethnicity within Jewish political thought. This historical reading of the roots of 'Jewish genetics' ought to expose why the Israeli state is attempting to understand itself in the present through technoscience.

In the mode of the Frankfurt School, this reading assumes that what exists depends on how and why we know it. Rather than regarding ethnic genes as being pure essences 'in themselves,' a 'negative dialectical' critique emphasizes the necessary historical particularities of the mediations of their ontological claims (Adorno 1980[1966]) and precisely strives for the "negation of reification" (Horkheimer and Adorno 2002[1947]:vii). This approach will also help in thinking comparatively about how and why other states, like Qatar, might similarly draw on genetic technologies in determining rights to citizenship, and in imagining the borders of ethnic belonging.

Jewish Ethnicity

Judaism is a blurry ethnos. And while clear-cut racial divisions are perhaps the ideological construction *par excellence*, the borders of Jewish ethnicity are being complexified and reformulated with the latest next-generation genomic sequencing technologies.[12] 'Nature' becomes more political, more geographically and historically specific, and more culturally particular, as genomic technologies get grounded in different national spaces. In the Israeli context, ethnic genes have already entered public discourse, especially since geneticists have been describing the genetic structure and historical migrations of Jewish populations (See Atzmon *et al.* 2010; Behar *et al.* 2010, 2006, 2004; Bray *et al.* 2010; Ostrer and Skorecki 2013; Ostrer 2001). It has been said that such genetic research is contributing to a "'biologization' of Jewish culture and historical narrative" (Egorova 2014:354), as lay commentators now often turn to DNA evidence as a "rhetorical means for inscribing identities," especially to support "favoured

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[12] See Prainsack and Hashiloni-Dolev (2009) for a review of the impacts of the so-called 'new genetics' on collective identities, including nation, race, and ethnicity.

accounts of the origin and historical development of the tested communities" (Egorova 2014:360).

There are strong reasons for the popular appropriation of these scientific findings. Jewish population genetics studies usually treat diverse diaspora groups of Jews as a related cohort and often trace genetic data to support the narrative of a line of descent from the ancient tribes of Israel. In this regard, 'Jewish genetics' reiterates and lends credibility to, the Israeli state's founding narrative of return to the Holy Land. So-called 'Jewish DNA' is being read through personal genomic testing, even when 'Jewish genes' are located in areas of 'non-coding DNA,' that is, from genetic material that probably does not in itself determine a specific physical trait. These so-called 'Jewish genes' may not make a difference at all (phenotypically, at least), and yet they would become vital if they become the legible traces that decide rights to citizenship in Israel.

Regardless of the validity or biological importance of such genes to Judaism, at issue is the question of *why* genes are becoming a site for the Israeli state to imagine control of the population. What does this potential development say about the trajectory of the Israeli state, its commitments to religious law, and how this emergent phenomenon connects with or breaks from a long history of Jewish political thought and imaginations of Jewish ethnicity?

Here, the ethnic composition of Israel is crucial. Despite the ambiguity in respect of the legal, biological, and social 'nature' of 'Jewish genes' and their intermittent role in the reproduction of Jewish identity, Israel is an ethnically diverse country. Many Jewish immigrants have arrived from Eastern Europe, North Africa, France, India, Latin America, Yemen, Iraq, Ethiopia, the US, Zimbabwe, South Africa, and the ex-Soviet

Union, not to mention Israel's indigenous Arab minority of close to 2 million people. And while Jewishness has often been imagined as a biological race – most notably, and to horrific ends, by the Nazis, but also later by Zionists and early Israelis for state-building purposes – the initial origins of the Ashkenazi Jews who began the Zionist movement in turn-of-the-century Europe remain highly debated and enigmatic.

Recent population analysis by geneticists has led to an unresolved debate over Jewish origins (Abu El-Haj 2012; Elhaik 2012; Kohler 2014). Scientific research has begun to describe the genetic basis for common ancestry of the whole of the Jewish population (Behar *et al.* 2010), even though the historical claims that are entangled with these scientific studies are still contested. One of the most contentious claims made is that European Jews are descended from converts to Judaism from the Khazar Empire, which covered much of Eastern Europe during the second half of the first century CE (Koestler 1976; Sand 2009).[13] Some Rabbis and several population geneticists instead claim that there is a direct line of descent connecting most European Jews to the biblical land of Israel (Sand 2009).[14] But Israeli historian Shlomo Sand (2009:22) argues, "the Jews have always comprised significant religious communities that appeared and settled in various parts of the world, rather than an *ethnos* that shared a single origin and wandered in a permanent exile."

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[13] Wheelwright, J. (2013) *Defining Jews, Defining a Nation: Can Genetics Save Israel? The Atlantic*, Mar at http://www.theatlantic.com/global/archive/2012/03/defining-jews-defining-a-nation-can-geneticssave-israel/254428/

[14] See Wheelwright (2013) above at 64. Also, Alperin, M. (2014) How DNA Testing Can Reveal Jewish Ancestry, Bolster Zionist Narrative, Oct 15, *Jewish News Syndicate*, at http://www.jns.org/latest-articles/2014/9/19/how-dna-testing-can-reveal-jewish-ancestry-and-bolster-the-zionist-narrative#.VULmI5OznMg=

Regardless, Jews are widely believed to have resided in the Levant for several centuries before the destruction of the Second Temple[15] and European Jews are thought to have resulted from dispersals of Jews to the north into Europe and the Mediterranean in the early Middle Ages. It is assumed that following expulsion from Western Europe, in around the thirteenth and fifteenth centuries, Jewish communities expanded eastwards to Poland, Lithuania, and Russia. As European Jews have arguably experienced much more persecution and suffered more displacements than Jews living in the Arab world, it is unsurprising that political Zionism emerged almost exclusively as a European Jewish political movement, with the large-scale immigration of Jews from the Arab world not beginning until the foundation of the Israeli state in 1948.

The stakes in the debate over Jewish origins are high, however, since the founding narrative of the Israeli state is based on exilic 'return.' If European Jews have descended from converts, the Zionist project falls prey to the pejorative categorization as 'settler colonialism' pursued under false assumptions, playing into the hands of Israel's critics and fueling the indignation of the displaced and stateless Palestinian people. The politics of 'Jewish genetics' is consequently fierce. But irrespective of philosophical questions of the indexical power or validity of genetic tests for Jewishness, and indeed the historical basis of a Jewish population 'returning' to the Levant, the *Realpolitik* of Jewishness as a measurable biological category could also impinge on access to basic rights and citizenship within Israel. Looking at the issue internal to Israel's national politics and modes of governmentality, a geneticization of the idiom of citizenship would actually mark a new moment in the Zionist political philosophy that motivated the state's

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[15] In Jerusalem in 70 CE.

emergence, since many of the European Zionists that founded the Israeli state differed widely on the basic principles upon which Jewish nation-building should be pursued. In connecting genetic identity to nation-building, I follow Weingrod (2015:317), in thinking of nation-building as

> "processes through which citizens in a society reach broad agreement regarding common values and goals, develop effective institutions that are able to mediate differences, agree to seek the 'common good,' and also share mutually agreed upon symbols and language."

The basis for connecting the diaspora Jews of the world in a single state followed several different imaginations of citizenship, varying across political, labor, cultural, and religious Zionism. The various propositions include: That there existed amongst world Jewry a unity consisting of a spiritual tie, a togetherness consequent to shared persecution, a shared history as an exiled ancient diaspora nation, a 'natural' ethno-racial cohort. The materiality/immateriality of Jewish ethnicity remains ambiguous, particularly regarding the role of biological inheritance in guaranteeing Jewish identity. What exactly connects Jews as a national group? Why the nascent potential impact of genetics on rights to citizenship? Why is biology now an important site for authenticating the state's founding narrative of exilic return? How does the emergent genetic turn reconfigure these conceptions of the Jewish nation? This chapter considers how and why biological measures of Jewishness are becoming an increasingly important part of the Israeli national discourse. That is to say, the way Jewish ethnicity is imagined as something rooted in the body, transmitted by genes, and shared by the world Jewry. The circulating language of genetics is thus a site for reading the way that both the Israeli state and its citizens are attempting to understand, regulate, and reproduce, themselves in the political present through the visions and imaginations afforded by science and technology. First, a look at the origins of Jewish nationalism.

Zionism and Jewish Identity

The Zionist movement emerged in turn-of-the-century Europe as a nationalistic response to solve the so-called 'Jewish question' on modern political terms, though different strands of Zionist thought have been divisive in both their explicit political goals and their religious sensibilities. While so-called Labor Zionists, influenced by Marxist-inspired reform in Russia, advocated a secular state, emphasizing vigorous physical labor and pointing to the nourishing and rejuvenating effects of working the land, religious Zionism, on the other hand, foregrounded a more diffuse spiritual unity as the essential condition that would realize the universality of the ideal Jewish state and unify the Jewish people. Distinct formulations of the ontology of the Jewish political subject are in contention, with the very 'nature,' that is to say the core fundamental definition, of Jewish ethnicity and citizenship "co-produced" (Jasanoff 2004) with the political *telos* of community building pursued. In other words, the various dominant images of Jewish ethnicity, and their performances must be apprehended in their particular social, cultural, political, and historical milieux.

To parse such distinct configurations of Jewish ethnicity, and examine the ways in which different political goals entailed different ideas of Jewish citizenship, a brief reading of some of the political philosophies of early key Zionist thinkers, tracking the continuities and incommensurabilities and identifying the common threads that unite their diverse political imaginaries, will prove useful. The purpose of this line of thinking is to reveal the historical foundations of the contemporary Israeli situation and at the same time expose the history of the concepts of Jewish citizenship and ethnicity in the discourses that framed the founding of the state. To begin, the ways these Zionist thinkers conceived of diaspora Judaism, and how by distinction the Israeli citizen, or the 'New Hebrew,' would be self-fashioned while being physically and/or spiritually relocated proximal to the epicenter of Jerusalem, will be revealing.

Austrian journalist Theodor Herzl was one of the key founders of political Zionism whose ideas had their roots in the ambivalent neo-Romanticism of *fin de siècle* Europe, that is, "between the fears and despairs of the post-Enlightenment Kultur and the respect and awe of post-industrialist scientific rationality, or *Zivilisation*" (Falk 1998:590). Herzl (1896) thought that attempts at assimilation of Jews into European society were in vain since it was always the majority of each country who could decide who was a native and who an alien. He resented the idea of 'belonging' as a criterion of privilege determined in the hands of exclusive national elites. He thought anti-Semitism to be a problem that would need to be solved by both global Jewry and non-Jews acting in concert, thus transforming the 'Jewish question' into a distinctly international political problem to be negotiated and resolved between nation states on the world stage. In this regard, political Zionism's birth and strategic vision are a precise reaction to the rise of anti-Semitism, European nationalism, and modern mythologies of ethnic purity, but importantly, they are not an internal movement inherent to, intrinsic to, or a 'natural' aspect of, the Jewish diaspora in any unequivocal sense.

Consequently, one of the trends in Zionist thought that sought to move against this kind of reflexive responsiveness to external political pressure and persecution was to re-root the Zionist movement on the organic plane of bodily labor, to take charge of the historical refashioning of the diaspora Jew to the new Hebrew. Labor Zionism thus sought to reconcile Jewish history through the conjunction of a powerful ideology of Jewish nationalism with a strong desire to work hard and cultivate a robust Hebrew body. This ideology would demand an overhaul of Jewish political life and a transformation in diasporic traditions to inculcate the practice of Jewish nationalism at the level of the body, particularly through arduous labor practices. The early labor Zionist and Ukrainian journalist, Micha Josef Berdichevski (1900:294) underscores this imperative for historical rupture with diaspora Judaism, echoing Nietzsche's philosophical treatise on the 'will to power,' saying:

> "It is not reforms but transvaluations that we need—fundamental transvaluations in the whole course of our life, in our thoughts, in our very souls. Jewish scholarship and religion are not the basic values—every man may be as much or as little devoted to them as he wills. But the people of Israel come before them—'Israel precedes the Torah.'"

Accordingly, the Russian Zionist thinker Aaron David Gordon took up this thread to provide a theory of Jewish labor that he claims would propel the Zionist movement forward to practical success. In the belief that Jews could become whole again by living the life of nature, Gordon likewise identified hard bodily labor as the essential habit that Jews lacked. He says (1911:373)

> "Labor is not only the force which binds man to the soil and by which possession of the soil is acquired; it is also the basic energy for the creation of a national culture. This is what we do not have—but we are not aware of missing it. We are a people without a country, without a living national language, without a living culture."

In Gordon's prognostications, a culture of labor would serve as the very glue, or the 'basic energy,' that could tie men to each other, to the land, and through that dialectical process, fill a deep lack and secrete a national culture to be enjoyed and sustained collectively. Further, for Gordon, ‘culture’ was the dynamic and self-reinventing language of identity politics, and the new Hebrew Zionist movement would spread and be reproduced through joint labor, a manifest practice of nation-building. He painted a vivid picture of the ‘nature’ of the labor Zionists’ mutual solidarity with the acoustic metaphor:

> “The ethnic self…is like choral singing, in which each individual voice has its own value, but in which the total effect depends on the combination of the relative merit of each individual singer, and in which each individual singer is enhanced by his ability to sing with the rest of the choir” (Gordon 1920:380).

While labor and political Zionists generally saw the move towards self-determination as a process of manifest vindication, the culturally inflected school of Zionist thought was apprehensive about this headfirst dive towards a new Jewish culture. In fact, Ahad Ha’Am rejected the Nietzschean will to power that Gordon backed so confidently, believing that hasty state building and cultural refashioning would be a naïve mistake. He feared the ‘moral good’ would no longer be valued, but Jews would instead raise up the human type above the general level of mankind, and he doubted whether the moral development in the cultivation of a ‘Superman’ ideal would serve the Jewish tradition well. He warned about potential regression:

> “Seeing that the goal is the mere existence of the Superman, and not his effect on the world, we have no criterion by which to distinguish those human qualities of which the development marks the progress of the type, from those which are signs of backwardness and retrogression” (1898:225).

With no agenda except the acquisition of power and instrumental domination of the immediate political environment, the Hebrew Superman is bereft of any moral compass to offer guidance toward an ethical future. According to Ahad Ha’Am, Israel was already chosen by God for “moral development” (1898:229); Israel has a moral purpose that is divinely inspired, and as such, a transvaluation of its existing values would be an affront to God’s will, disrespecting history and its “universal historical laws” (1898:241). As to how to realize the ideal endpoint, the resolution that Ahad Ha’Am advocated is a reconciliation of the dualism of flesh and spirit—material and immaterial aspects of the Jewish individual—in a manner that is compatible with Jewish history and religious traditions: “The two elements in man, the physical and the spiritual, can and must live in perfect accord” (Ahad Ha’Am 1904:150). He (1904:155) says:

> “spirit without flesh is but an unsubstantial shade…the spirit of Judaism could not develop and attain its end without a political body, in which it could find concrete expression.”

In this formulation, the historical dialectic is closed, and the Jewish spirit can only be realized in concrete terms through the establishment of the ethical Jewish state, and the state can only be enlivened with the healthy spirit of the committed and ethical citizen. This formulation of the Zionist *telos* breaks entirely from the labor Zionists’ viewpoint in that it refuses to bury Jewish history. More importantly, it sees the state as the materialization of spirit, which is to say that the dualism of spirit and flesh is folded into an ethic of state building. In terms of realizing the birth of the state of Israel in practical terms, Ahad Ha’Am warns against looking forward with eager aspirations to modern novelty. Instead, Jews should look to the past for inspiration. Rather than tearing the fabric of Jewish traditions asunder, his conservative Zionist vision demands that the national Ego emerge organically from history and law, or precisely, from the “foundations of the past” (Ahad Ha’Am 1904:89).

Not all thinkers shared this conservative view regarding tradition. In profound opposition to Ahad Ha'Am's thoughts on preserving the foundations of Jewish history as though they were the inherited treasures of time, more recently the Boyarin brothers (1993) praise diaspora Judaism's *bricolage* culture as a testament to the resilience and adaptability of Jews in the face of uncertain conditions. They pin Jewishness as precisely the ability to adapt, go unnoticed, and succeed as a "cultural trickster." They thus embrace the emergent cultural form of a dynamic diaspora Judaism. In rejecting the idea of Judaism as a fixed and essential cultural form, they say:

> "Diasporic cultural identity teaches us that cultures are not preserved by being protected from 'mixing' but probably can only continue to exist as a product of such mixing. Cultures, as well as identities, are constantly being remade" (1993:721).

Though this kind of flux may be true of all cultures, they assert that diasporic Jewish culture makes it impossible to see "Jewish culture as a self-enclosed, bounded phenomenon" (1993:721). This diasporic relational ontology of Jewish ethnicity, as defined by cosmopolitan experience, is fundamentally incompatible with a Zionist project of Jewish nationalism that sees the spatial sequestration of Jewish citizens to an exclusively Jewish ethnic homeland.

In distinction to such a fluid, contingent, and contextual conception of Jewish identity, religious Zionists, however, typically emphasized the immaterial spiritual component of Jewish identity and the importance in gathering Jews in the land of Israel. In this regard, Abraham Rav Kook, the first Ashkenazi rabbi of British Mandate Palestine, and an enigmatic and mystical philosopher of Judaism is exemplary of religious Zionism. Kook thought of Israel as "not something apart from the soul of the

Jewish people" but "part of the very essence of our nationhood… bound to its very life and inner being" (Kook 1910:419). This relation between soul and land that he professes cannot simply be explained away in political rhetoric or philosophy. Rather, he says, "Human reason, even in its most sublime, cannot begin to understand the unique holiness dormant within our people" (1910:419). Writing outside of a rationalist 'modern' discourse, or a dialectical tradition attempting to reconcile contradictions, Kook's mysticism transcends the realm of concrete politics and moves into the diffuse realm of the experiential Holy. "Deep in the heart of every Jew," he writes, "in its purest and holiest recesses, there blazes the fire of Israel" (1910:421). Seeing Israel as an extension of the redemptive process that commenced with the exodus from Egypt, the "Light" of Israel can be understood in his thoughts as being on the plane of a cosmic totality, being the final Jewish redemption with which history has been forever pregnant. Such messianic religious Zionism is far removed from the pragmatic action advocated by political and labor Zionism, but like cultural Zionism, it foregrounds the immaterial dimension of diaspora Judaism and the spiritual component of Jewish ethnicity. Religious Zionism does not, however, regard Jews as a race in the biological idiom of modernity.

In the late 1800s and early 1900s, however, before the establishment of the State of Israel, and in the post-Enlightenment milieu of secularization, Jews became understood as a racial category. Berman (2009:16) writes:

> "Jews themselves had helped construct racial typologies that classified Jewishness as a biological variant. Indeed, race language was a useful way to talk about Jewishness: it demanded little in the way of specific practice from Jews, and it seemed to guarantee Jewish survival as long as Jews continued to reproduce themselves"[16]

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[16] See, Dillingham (1910)

However, racial constructions of identity also served hierarchical notions of racial superiority. “Race assumptions marked human difference in powerful ways, but they were also often employed to naturalize hierarchies among social groups” (Berman 2009:16). Racial ideas also set Jews apart as fundamentally and unchangeably different from their Christian neighbors (Kaye/Kantrowitz 2007:13) and often fueled virulent anti-Semitism. After WWI, Jews turned away form biological understandings of Jewish ethnicity. Scholar of Judaism Jonathan Sarna attributes this evolution of thinking, “[i]n response to Hitler, and in line with the teachings of anthropologists, they may have looked to culture rather than biology to explain the origin of ethnic differences” (Sarna 2011:108). Shifting away from both a racial and religious understanding of Judaism, Jewish thinker Mordecai Kaplan argued:

> “Jews should be understood as a ‘distinct societal entity.’ … what made a Jew a Jew was not what he or she believed, but how he or she lived. Religion, in other words, was a social phenomenon, and Jewishness, larger than religion alone, was a composite of social phenomen[a]” (Berman 2009:4).

The establishment of the State of Israel, however, problematizes a single precise definition of Jewishness, since the State was founded on secular socialist principles, relies on *halakha* (religious Jewish law), and was built by waves of culturally diverse Jewish immigrants from Europe, North Africa, and the Middle East, all with varying levels of Jewish religious practice.[17] Maintaining a steady stream of Jewish immigrants is a crucial facet of Israeli state-building, facilitating the integration of world Jewry, and fulfilling the

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[17] See Nesis (1970:59).

state's mission as homeland and refuge for all Jews.[18] The "authenticity" of Jewish immigrants for Israeli state-building "has been judged (often simultaneously) in both religious and bioethnic terms" (Burton 2015:82).

For example, the Population Registry Law 5725-1965, requires residents to enter both their *le'oum* (nationality or ethnic group)[19] and religion in the registry.[20] A recent Israeli Supreme Court case affirmed an earlier precedent and distinguished *le'oum* or nationality, from secular citizenship; the court rejected the petitioners' request to list "Israeli" under the nationality rubric on their identity documents, which would reflect their citizenship and belonging to an imagined Israeli nation, rather than "Jewish," which reflects their ethnoreligious affiliation.[21]

Having touched briefly here on the various regimes of values that have spurred the distinct strands of Zionism that emerged in early 20th-century Europe—labor, religious, cultural and political: movements that jointly contributed to the establishment of the state of Israel—it is clear that many elements of these movements rest on distinct images of Jewish citizenship and nation-building, and run in parallel. Political Zionism

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[18] See Nesis (1970:59), quoting Eban (1984:191) ("[T]he driving force in Israel's life is still generated by immigration movements[.]").

[19] "[T]he hebrew word *leoum* can be translated as 'ethnic group' or 'nationality' or 'peoplehood'[.]" Nesis (1970:54).

[20] Israel's Population Registry Law, 5725-1965, 19 LSI 288 (1964-1965) (Isr.) (replacing the Registration of Inhabitants Ordinance, 5709-1949).

[21] See Gross (2013); CA 8573/08 Ornan *et al.* v. Ministry of Interior (Oct. 2, 2013 amended on Jun 10, 2013), (Isr.); HCJ 8140/13 Ornan v. State of Israel (Dec. 9, 2013) (Isr.) ("we are dealing here with a sensitive and highly controversial issue on both a historical and moral level that has been with the Jewish people for many years and with the Zionist movement from its very beginnings. The concept that Judaism is not merely a religion but also a national affiliation is a cornerstone of Zionism. Against it presents itself the concept according to which Judaism is merely a religion, and therefore the national affiliation of Jews is according to the state of which they are citizens."). See also CA 630/70 Tamarin v. State of Israel, 26(1) PD 197 [1972] (Isr.) (rejecting Tamarin's subjective feeling of belonging in the Israeli nation and refusing to let Tamarin "change the entry of the rubric *le'om* in his identity card and in his file in the Registry from Jewish to Israeli.").

hinged on a relational ontology of Jewishness, with Herzl pointing to anti-Semitism as the intersubjective constitutive factor in binding diaspora Jews with a common political goal. Labor Zionists emphasized ‘solidarity’ and a shared culture of bodily practice, and cultural Zionism rested on the creative use of Hebrew and valued historical continuity, while religious Zionism explicitly emphasizes both a spiritual and material connection between Jews and the land of Israel. This disparate set of roots that later yielded the Israeli state has grown from a heterogeneous entanglement of diverse political thought to yield a centralized state apparatus, with varying attitudes towards the social ‘nature’ of Jewish citizenship as it is condensed into law and practice. In order to determine how these various layers of Zionist thought have led to the present case in which Judaism can be attended to at the molecular level, as with ‘Jewish genes,’ a look at contemporary secular Israeli culture is crucial.

Israeli Society

It is the mainstream secular Zionist national identity, as it emerged as a hegemonic force in the early years of the Zionist movement, that provides insight into the development of what Kimmerling (2005) terms “Israeliness.” While the Israeli state is still today an immigrant settler polity that lacks a consensual social identity, raising questions over its boundaries and positioning in the geopolitical environment of the Middle East, the pluralism of the state’s demography still fosters a sense of collective Israeli community (Kimmerling 2005). His analysis of contemporary Israeli society posits seven distinct ‘cultures’ that comprise the pluralism of contemporary Israel: the secular Ashkenazi upper class; the national religious; the traditionalist Mizrahim (Arab

Jews, who have presumably always resided in the Near East, and North African Jews); the Orthodox religious; the Arabs; the Russian immigrants (especially since the fall of the Soviet Union); and the Ethiopians (who mainly immigrated to Israel in the 1980s and 1990s) (2005:2). Together, these groups form Israel's population of 8 million total people, of which approximately 6 million are Jews. Serving to combine these distinct Jewish cultural groups with unity, he identifies the state, the education system and the military as the three key institutions that jointly help to stabilize a notion of a shared "Israeliness." But the Israeli state poses problems for the affordance of formal equality to all of its citizens. While there are secular Jews and a secular cultural life in Israel, it is not automatically clear whether "Israeliness" is a class of citizenship that necessarily requires Judaism at some fundamental level, necessarily excluding non-Jews from complete civic inclusion.

'Citizenship' is, therefore, an illuminating concept for examining the political workings of diverse democratic states and their particular state-citizen relations. Shafir and Peled (2002:1) claim that Israel's principal moral political dilemma is the need to choose between the cardinal principles of the universalist commitment to being a Western-style democracy versus the particularist commitment to being an exclusively Jewish state. They argue that it is not possible to separate Israeli democracy and Israeli citizenship from its settler-colonial beginnings. Nor is it possible to separate these settler-colonial origins from the state's continued journey (Shafir and Peled 2002:1), since in Israel ethnonationalism denies the possibility of cultural assimilation to non-Jews as the discourse on citizenship incorporates non-political cultural elements as critical determinants of assimilation. How citizens are legally made, through the law that governs Jewish immigration (*Aliya*), is crucial.

Jewish *Aliyah* (Immigration)

Immigration of Jews in Israel is governed by Israel's Law of Return 5710-1950, which provides: "Every Jew has the right to come to this country as an *oleh* [Jewish immigrant]."[22] The Law is implemented by the Minister of the Interior.[23] "[I]n conjunction with the Citizenship Law, which allows every *oleh* . . . to receive citizenship, it enables every Jew to become a citizen of the state, almost automatically."

Oleh is the noun for a Jewish immigrant to Israel, and derives from the Hebrew verb 'to rise, or ascend.' The related gerund *aliya*, meaning Jewish immigration, thus connotes the spiritual ascension imagined with immigration to Israel. For the first twenty years that the law was in place, it did not define who was a Jew and thus did not provide guidance on who had the right to immigrate (Burton 2015:79). In 1970, the Law was amended to include a definition of Jew that reads, "For the purposes of this Law, 'Jew' means a person who was born of a Jewish mother or has become converted to Judaism and who is not a member of another religion."[24] The 1970 amendment also expanded citizenship rights to family members of eligible Jews:

> The rights of a Jew under this Law . . . as well as the rights of an *oleh* under any other enactment, are also vested in a child and a grandchild of a Jew, the spouse of a Jew, the spouse of a child of a Jew and the spouse of a grandchild of a Jew, except for a person who has been a Jew and has

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[22] Law of Return, 5710-1950, 4 LSI 114 (1949-1950) (Isr.).

[23] Law of Return (Amendment 5714-1954), SH No. 163 p.174 (Isr.).

[24] Law of Return (Amendment 5730-1970), SH No. 586 p.34 (Isr.).

voluntarily changed his religion.[25]

The amendment represented a compromise position between the religious and secular perspectives.[26] The amendment adopted the religious, *halakhic* definition of a Jew – someone with a Jewish mother or someone who has converted to Judaism.[27] However, the amendment also extended citizenship rights to those who are referred to as "seed of Israel" – "a halakhic term that applies to anyone either born to a non-Jewish mother and a Jewish father, or having at least one Jewish grandparent" (Maltz 2015).[28] Thus, the law grants citizenship rights both to those who are religiously Jewish but would not have Jewish biological links, such as Jews who converted, as well as those who do not have religious or biological connections to Jewishness, such as spouses of Jews.

The 1970 amendment was a response to a controversial Israeli Supreme Court case that permitted children of a Jewish father and non-Jewish mother to register as part of the Jewish *le'oum* or ethnic group in the Population Registry.[29] Additionally, "[t]he

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[25] Law of Return (Amendment 5730-1970), SH No. 586 p.34 (Isr.).

[26] Altschul (2002:1356).

[27] It is important to note that the amended law did not define what type of conversion was necessary. From its enactment, it was identified as an area for future challenge: "[f]rom [that] point onwards, the question was no longer 'who is a Jew'; it became instead 'who is a convert'."

[28] The term "seed of Israel" "also has a [slightly different and] broader definition that applies to anyone with demonstrated Jewish ancestry dating back several generations."

[29] Shalit v. Minister of the Interior involved a Jewish naval officer who married a non-Jewish Scottish woman; the couple lived in Israel with their two children (Baer 1971:133). The Shalits were atheists and attempted to register their children as Jewish under the *le'oum* or nationality designation and leave the religion category blank. *Id*. at 133-34. The Registry, under guidance from the Ministry of Interior, refused to permit this since Mrs. Shalit was not Jewish, and therefore the children did not belong to the Jewish nation under religious law. *Id.* at 134. The Israeli Supreme Court initially attempted to avoid a decision and recommended that the Knesset strike the *le'oum* or ethnic category from the Registry Law because it was too vague. *Id.* However, the Knesset disregarded the request and the Court was forced to decide. *Id.* In an unprecedented nine-judge panel decision, delivered via eight long opinions, the Court ruled 5-4 that the Ministry clerk did not have the right to question the Shalits' application and thus the children should be registered as their parents wished. *Id.* at 135. The majority attempted to limit the scope of the decision;

amendment was intended to accommodate a small number of mixed nuclear families as the result of [this Supreme Court] ruling."[30] According to the Jewish Agency for Israel, "[t]his addition not only ensured that families would not be broken apart, but also promised a safe haven in Israel for non-Jews subject to persecution because of their Jewish roots."[31] The amendment, therefore, expanded who was granted entry and citizenship but restricted who was classified as part of the Jewish *le'oum*, or nation.[32]

Since the law was amended, and especially since the fall of the Soviet Union in the 1990s, the population of immigrants in Israel has shifted significantly. Made possible by the changes in the Law of Return, as well as looser restrictions in the Former Soviet Union (FSU) that permitted residents to leave, Jews from the FSU have arrived in Israel en masse. According to some estimates, nearly a million people have come to Israel from the FSU under the Law of Return; at least a third of these are not Jewish according to religious law and by their own admission.[33] Many of these individuals had assimilated

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Justice Sussman in concurrence explained that "the question is not 'Who is a Jew?,' since the term has many meanings, but rather who is considered a Jew for purposes of this law." *Id.* at 142. Justice Cohen wrote that this was a secular law that the Court was asked to interpret and therefore religious law should not control. *Id.* Further, he qualified the decision by reiterating that the Registry Act "states that the answers to *leum* and religion do not provide prima facie evidence of their correctness." *Id.* Almost immediately, in response, the Knesset amended the Law of Return and the Population Registry Law to mandate that anyone who registers as Jewish under either nationality or religion classifications must meet the religious definition. *Id.* at 145. As one commentator described it, "the amended law 'overruled' the Shalit case by adopting the religious law test of defining who is considered Jewish, but the law saved the spirit of the Shalit decision by" granting non-Jewish family members the right to immigrate under the Law of Return. Altschul (2002:1357).

[30] Burton, (2015:79), citing Cohen and Susser (2009).

[31] *The Law of Return*, The Jewish Agency, http://www.jewishagency.org/first-steps/program/5131 (accessed Feb 16 2015).

[32] See, e.g., Richmond, (1993).

[33] Rabbi Reuven Hammer (2011), On Proving Jewish Identity YD 268:10.2011, *Committee on Jewish Law and Standards*, CJLS, The Rabbinical Assembly, May 24, 2011, at 1 http://www.rabbinicalassembly.org/jewish-law/committee-jewish-law-and-standards/yoreh-deah. One

and secularized in the FSU, often abandoning Jewish religious practices and intermarrying with non-Jewish Russians. Some statistics suggest that Russian immigrants have different feelings of Jewishness and belonging than their Israeli-born counterparts.[34] Further, some non-Jewish Russians, who sought better economic opportunities, took advantage of the law and pursued entry through false documentation.[35] Although many Russian immigrants are Jewish by descent and are entitled to citizenship, their Jewishness is questioned by the Ministry of Interior and they are often required to show additional proof. This proof, however, has often been difficult for Russian Jews to produce "because of the lack of reliable documentation. Ketubot [wedding contracts] have been largely non-existent among Russian Jews for over half a century. There have also been cases of forged documents."[36] These individuals face even more skepticism by rabbinic authorities, as many are not considered Jews under Orthodox Jewish law. According to Rabbi Hammer,

> "[t]he position of the Jerusalem Bet Din of the Chief Rabbinate on these matters has been that regardless of the position of the [earlier religious teachings], they do not believe anyone coming from Russia without specific proof. Rather they must see a birth certificate and that of the person's mother."[37]

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reporter noted that several hundreds of thousands of immigrants came from the FSU in the 1990s alone on the basis that they were "seeds of Israel." See also Altschul (2002:1359) (estimating that more than half of the Russian immigrants who arrived in 1999 were not Jewish under religious law).

[34] Altschul (2002:1360).

[35] Richmond (1993:117): "estimating that in the 1990s three percent of Russian immigrants "abuse the system in this manner."

[36] See Rabbi Reuven Hammer (2011), above, at 1.

[37] See Rabbi Reuven Hammer (2011), above, at 11.

Secular and Religious Jewishness in Israel

This context of suspicion, coupled with the discrepancies between eligibility for Israeli citizenship and religious classification as part of the Jewish nation create many challenges for Israeli citizens who are not considered religiously Jewish. This is particularly difficult for interfaith marriage. Israel is governed by a dual legal system, where both civil and religious courts have jurisdiction over various areas of the law. Based on the millet system adopted from the Ottomans, the laws governing personal statuses, such as marriage and divorce,[38] are part of the exclusive jurisdiction of the religious courts.[39] Under this system, only Jews who are *halakhically* Jewish are eligible to marry in the religious courts, belong to synagogues, or be buried in Jewish cemeteries. Further, there is no civil marriage in Israel (Burton 2015:82). One of the main functions of the rabbinic courts is therefore to provide judicial rulings on whether a person is Jewish. For the many immigrants from the FSU, the rabbis follow a standard procedure that involves examining Soviet-era documents, like birth certificates, that contain a citizen's nationality. There are good reasons to search for authentication of Jewish identity.

The number of immigrants who are eligible to immigrate under the Law of Return but are not religiously Jewish is quite staggering. One recent study, by demographer Sergio Della Pergola, suggested that by a religious definition there are roughly fourteen million Jews around the world (people born to a Jewish mother), but over twenty-three

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[38] This is according to Rabbinical Court Jurisdiction (Marriage and Divorce) Law, 1953 §1, 7 LSI 139 (1953) (Isr.). Although adoption and inheritance used to be under the religious court jurisdiction this was changed through various legislative acts.

[39] This was the result of the Law and Administration Ordinance, 1948, 1 LSI 9 (1948) (Isr.).

million people who are eligible for citizenship under the Israeli Law of Return.[40] The Ashkenazi Chief Rabbi of Israel, Rabbi David Lau, knows of one family, where "[b]ecause of one Jewish grandfather who is buried in Moscow, over [seventy-three] people (his children and grandchildren) moved to Israel through the Law of Return."[41] This leaves a large segment of the population eligible for immigration and citizenship but ineligible to legally marry and reproduce as fully recognized members of the Jewish population. The potential move to mandate genetic tests of Jewishness as a requirement for immigration eligibility threatens to increase this divide since a genetic test cannot guarantee a Jewish classification in the Population Registry,

According to a Foreign Ministry spokesman, the reported policy "decision to require DNA testing for Russian Jews is based on the recommendation of *Nativ*, an educational program under the auspices of the Prime Minister's Office to help Jews from the FSU immigrate to Israel" (Zeiger 2013). The Prime Minister's Office attempted to distinguish the purpose of the test as a secular immigration regulation rather than a marker of religious identity. The Prime Minister's Office reported: "We're not talking about a test to determine Jewishness. We're talking about a test to determine a family bond that entitles [the child to] *aliyah.*"[42] By emphasizing the distinction, the Prime Minister's Office maintains the line between secular citizenship and religious belonging in the Jewish nation and thus reinforces a secular understanding of a biological kinship-

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[40] See K. Nachshoni (2014) Chief rabbi: Stop allowing non-Jews to make *Aliyah*, Nov 3, *YNet News*, at http://www.ynetnews.com/articles/0,7340,L-4587242,00.html

[41] K. Nachshoni (2014) Chief rabbi: Stop allowing non-Jews to make *Aliyah*, Nov 3, *YNet News*, at http://www.ynetnews.com/articles/0,7340,L-4587242,00.html

[42] Silverstein, R. (2013) *Birthright, Israeli Government Demand DNA Tests to Prove Jewishness*, Aug 4, Tikkun Olan Blog, at http://www.richardsilverstein.com/2013/08/04/birthright-israeli-government-demand-dna-tests-to-prove-jewishness/

based conception of Jewishness as opposed to a religious or practice-based view. Biological imaginations of Jewish identity are becoming more common. I will now give more detail on the case that spurred the State's announcement about using genetic tests for potential immigrants.

Genetic Birthright

Nineteen-year-old Masha Yakerson, like many of her Jewish, college-age peers, attempted to sign up for a Birthright Israel trip in the summer of 2013 (Zeiger 2013). A Birthright employee told Yakerson, whose family is from St. Petersburg, Russia, that in order to prove that she was Jewish, and thus eligible for the trip, she would need to first take a DNA test. According to their website:

> "Taglit-Birthright Israel is a unique, historical partnership between the people of Israel through their government, local Jewish communities (North American Jewish Federations; Keren Hayesod; and The Jewish Agency for Israel), and leading Jewish philanthropists. Taglit-Birthright Israel provides a gift of peer group, educational trips to Israel for Jewish young adults ages 18 to 26."[43]

The Birthright administrator claimed that the test was required by the Israeli consulate in St. Petersburg and that a DNA test would be required if Yakerson ever wanted to make *aliyah* (immigrate to Israel). Yakerson's father called the policy "blatant racism toward Russian Jews" (Zeiger 2013).

In general, the requirements for teenagers from other countries to participate in Birthright are much less stringent and many participants do not meet strict definitions of Jewishness. For example, a similar post-college program, Masa, only requires

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[43] *Taglit-Birthright Israel, FAQ*, http://www.birthrightisrael.com/Pages/Help-Center-Answers.aspx?ItemID=1 (accessed Apr 30 2015).

participants to sign a document which declares that they are Jewish, without any evidence to substantiate their claim (Maltz 2014). In fact, "[s]ince Taglit-Birthright doesn't accept candidates who have visited Israel before, its participants often come from non-affiliated homes, many of them the products of mixed marriages" (Maltz 2014). Historically, "[t]rust was the default position" to determine if someone was Jewish (Ibid). If an individual claimed to be Jewish, he or she was believed. It is only more recently, in "an era of intermarriage, denominational disputes and secularization" that "Jews have ceased agreeing on who belongs" and doubt and skepticism have become the norm (Ibid).

After the news of this one student's experience made headlines, the Israeli Prime Minister's Office confirmed that many Jews from the FSU are asked to provide DNA confirmation of their Jewish heritage in order to immigrate as Jews and become citizens under Israel's Law of Return (Zeiger 2013). According to one source, the consul's procedure, which was

> "approved by the legal department of the Interior Ministry[,] states that a Russian-speaking child born out-of-wedlock is eligible to receive an Israeli immigration visa if the birth was registered before the child turned [three]. Otherwise a DNA test to prove Jewish parentage is necessary" (Zeiger 2013).

This issue arose or Yakerson because her family was in the United States when she was young and her parents did not register her birth until she was three years old.

While the State of Israel defines itself as the homeland of the Jewish people, making it ethnonational in its own self-image with a particular theological commitment,[44] this characterization does not define the "legal nature" of citizenship in Israel

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[44] The Declaration of the Establishment of the State of Israel, (May 14 1948).

sufficiently.[45] It is not yet clear how a novel biological definition of Jewishness[46] would impinge on Israeli law and basic rights to citizenship.

Scholar of Science, Technology, and Society, Sheila Jasanoff (2011:3) wrote, "periods of significant change in the life sciences and technologies should be seen as constitutional, or more precisely, *bio*-constitutional in their consequences." She elaborated that "[r]evolutions in our understanding of what life is burrow so deep into the foundation of our social and political structures that they necessitate, in effect, a rethinking of law at a constitutional level." However, the State of Israel has no formally written constitution:

> "From its inception, Israel has never had a formal constitution, but only the Basic Laws. In its first years of existence, the government felt that it would be premature to set down in a definitive and binding way the nature and goals of the states and the Law of Return does not fall under the seven Basic Laws of Israel. Nevertheless, most believe that the Law would be given a distinguished place in a future constitution because the Law captures the ideology upon which the state of Israel was founded."[47]

Consequently, the recent discussions of genetic tests for Jewishness, therefore, necessitates a rethinking of the specific Israeli law regarding the State's definition of Jewishness, and concomitantly, rights to citizenship. Following the controversial Yakerson case, Prof. Amnon Rubinstein (2016), an author and professor at the Interdisciplinary Center Herzliya, a former education minister, Knesset member, and an Israel Prize laureate in Law (2006) wrote:

"In Israel, there are no DNA tests without court approval. These tests are

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[45] See, e.g., Rabbi Dr. Lawrence S. Nesis (1970:53): "The question of who is a Jew had long been the subject of controversy in Israel"; and Mark J. Altschul (2002:1352): "Defining who is Jewish by Israeli standards is perhaps the most difficult question that has faced Israel since its inception."

[46] See Abu El-Haj (2012), Kahn, (2010, 2005), Ostrer (2001), Goldstein (2009).

[47] See Richmond (1993:100), for an analysis of Israel's Law of Return.

> only conducted when no other evidence of lineage can be found. In my opinion, when it comes to immigration to Israel, a mother's declaration regarding the identity of the Jewish father is sufficient – and there is no need for further proof… There is no genetic test that proves conclusively whether someone is Jewish or not. There are certain tests for the genetic continuity of Kohanim (the Jewish priestly bloodline) and of various Jewish communities, and these prove the exceptional similarity between Jews and Palestinian Arabs."

At this juncture, a closer look at the specific applications of Jewish genetics would prove instructive.

'Jewish Genetics'

Scholarship on diaspora Judaism has revealed how Jews were not just objects of racial classification and discrimination but that Jews also applied racial concepts to themselves in various ways and for specific purposes (Bloom 2007; Efron 1994; Falk 1998; Goldstein 2006; Hart 1999, 2010, 2011; Morris-Reich 2006). In the last decades of the 19th-century, for example, European Jews were subjected to radical "biologization," particularly in Germany. There, Jews were presented as an Oriental race and were attributed distinct physical and mental qualities (Hess 2002). German anthropologists regarded Jews as a pure race, formed as a result of their practice of endogamy (Efron 1994:20).

In some contexts 'race' was used to establish Jewish unity from within the Jewish community itself and was used to establish diversity and hierarchy amongst Jews. This was the case with Zionist literature that circulated in Mandate-era Palestine, for example. Consequently, Hirsch (2009:593) argues that an Israeli formation of ethnic Jewishness owes its history to:

> "the encounter of European Zionists with Eastern Jews, and from the tension between the projects of nation-building and of Westernization in the context of Zionist settlement in the East."

Furthermore, she (2009:596) argues that it was precisely concepts and ideologies such as "degeneration" and racial-eugenic "improvement" that migrated between the discursive fields of Europe and British Palestine that helped to blur the distinction between the biological, political, and social dimensions of Jewishness, making it difficult to separate the metaphor of eugenics from an emancipatory project of improvement and betterment via nation-building. In brief, it is clear that Israeli Jews' imagination of a unified Jewish race has its roots in European diaspora host nations, 20th-century biology, and essentialist nationalist imaginaries.[48]

Addressing the ways in which Jewish race science has transformed, and re-emerged, in the 21st-century, anthropologist of medicine Susan Kahn (2010:21) has identified three key ways in which Jewishness has now entered the molecular realm, with genes being defined as Jewish in three major ways: population genetics; genetic testing for both disease and Jewish identity; and human ova and sperm donation in the domain of assisted conception. In these different conceptual arenas, 'Jewish genes' and Jewish inheritance are determined in markedly different ways.

In relation to population genetics, or "tracing Jewish history through DNA," Kahn (2005:181) claims genetic studies must be situated within the larger sociopolitical context where the meaning of claiming Jewish identity can make a direct impact in terms of access to rights and resources. As reviewed above, Israel's Law of Return, the state's commitment to helping the Jews come to live in Israel, makes it important to have

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[48] See R. Falk (2017) for a comprehensive overview of the entangled history of Zionism and the biology of Jews.

verifiable evidence of ‘authentic Jewishness.’ But underserved Jewish communities already in Israel may benefit from proof of ‘authentic Jewishness.’

The marginal groups of the Beta Israel of Ethiopia,[49] the Kuki-Chin-Mizo from Northeast India,[50] the Bene Ephraim from India,[51] or the Lemba people of southern Africa, for example, could perhaps benefit from genetic evidence to support their claims to rights and equality. The Lemba people not only claim descent from a tribe of Israel with descent passed from father to son, and maintain some Jewish traditions such as a kosher diet, but Lemba men possess a ‘Jewish genetic marker,’ the Cohanim modal haplotype[52] (CMH), a genetic signature that has been identified among Sephardic priests in the Jewish population, with a frequency similar to that in the general Jewish population (in just under one out of every ten men). This adds support to their demands to be regarded as equals to the traditional elites. But as Kahn (2010:21) reports, Jewishness, as determined by genomic analysis, is embodied as “statistical probabilities that DNA haplotypes will be more prevalent” within groups, and not a clear ruling on whether an individual is Jewish or not.

The CMH, the ‘Jewish DNA haplotype’ that has received the most attention, was first publicized in the scientific journal *Nature* (Skorecki *et al.* 1997) in a study that identified six differences in the DNA sequence of male Jews that self-identified as Cohens. It was thought that the ‘Cohanim’ signature represents the inheritance of over

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[49] The Beta Israel are Ethiopian Jews who mostly immigrated to Israel in the 1980’s and 1990s. See Seeman (2010).

[50] The Kuki-Chin-Mizo is a small group that claims to be descendants of the tribe of Menashe.

[51] See Egorova and Perwez (2012, 2010).

[52] See Abu El-Haj (2012:287); Kahn (2010:13); Skorecki *et al.* (1997); Thomas *et al.* (2002, 2000).

one hundred generations from the founder of the patrilineal genetic line, with the signature traced to a date over 3,000 years ago in accordance with the oral tradition that the Cohens (Jewish priests) maintain a line of patrilineal descent from Aaron, the first Jewish priest (Kahn 2010:14). In line with the tradition of patrilineality, the CMH is only found on the male Y chromosome. However, since the Y chromosome mostly contains non-coding DNA, sequences that are not thought to translate into a physically expressed trait, it is unclear whether identification of the Cohanim signature holds any valid indexicality as to the nature of the bearer's body in terms of a physiological or biometric characteristic, even though it might be read as a valid inscription of ethnic history. This sort of ambiguous materiality is not the case with inheritable diseases, however, where DNA mutations carry a higher likelihood of developing a real disease. Indeed, European Jews are generally more susceptible to a range of inherited diseases that are associated with identifiable genes.

Common inheritable diseases amongst European Jews are Tay-Sachs, Canavan's disease, Gaucher's disease, Family Dysautonomia, Niemann Pick disease, and Huntington's disease, making it important that two bearers of the causative gene do not have children together.[53] Consequently, there have been moves to test individuals for genetic markers of disease, either before they form partnerships, or before they chose to have children together. The Brooklyn-based organization "Dor Yeshorim," for example, established a database of DNA comprised of samples from young Ultraorthodox Jews in high school (Kahn 2005:181). The samples are crosschecked so that genetically incompatible matches between prospective marriage partners can be recognized in an

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[53] See Dor Yeshorim, *Ashkenazi Genetic Traits*, https://www.jewishgenetics.org/ashkenazi-genetic-traits (accessed Apr 29 2015).

effort to avoid the spread of the genetic diseases in the community.

While the Orthodox community has generally embraced the genetic tests available, there remains a concern in the community about the “dangerous eugenic overtones” (Kahn 2010:17). That said, it remains unclear whether the use of genetic tests for diseases common amongst Jews is contributing to a reductionist rationality that a Jewish disease is evidence of a Jewish body, or indeed the existence of a Jewish biological race. In relation to ongoing research on diseases in the Ashkenazi Jewish population, however, Mozersky and Joseph (2010) argue that ethnic genetic medicine “reiterates a shared history and addresses culturally salient issues,” which in turn both “encourages active participation” and “contributes to a particular version of population.” This finding accords with the ethnographic study of medical genetics by Fujimura and Rajagopalan (2011:22) that “analyzed how scientists produce simultaneously different kinds of populations and population differences, sometimes by appealing to popular categories of race, ethnicity, or nationality, and sometimes to ‘genetic ancestry.’” They conclude (2011:22) “that the invention of new genetic concepts of ancestry relies on old discourses, but also incorporates new knowledges, technologies, infrastructures, and political and scientific commitments.” Genetic evidence thus gets lent meaning in the historical context of its interpretation, with all of the beliefs and commitments that shape the identities at play.

In the third sphere of ‘Jewish genetics,’ assisted conception, it should be noted that there is a strong association between fruitful reproduction and Jewish tradition. The Orthodox community has consequently been positive and receptive to the use of technologies to assist with fertility, and many rabbis will permit the use of genetic donor material to circumvent a range of adulterous, or incestuous, unions (Kahn 2005:184). Moreover, since Jewishness is traditionally passed from mother to child, non-Jewish sperm can also father a Jewish child if the mother is Jewish. However, the inheritance of Jewishness may be problematized if a surrogate mother carries a baby.

The question is whether a baby who has genetically Jewish parents, who donate the egg and sperm, but who is carried to gestation by a non-Jewish surrogate, will be Jewish. A recent case of this resulted in a rabbi from New York opining that the baby technically had three parents, and because the surrogate was not Jewish, the child was not Jewish (Chesler 2013). Believing the problem more complex than deterministic genetics or notions of modern biology, he reasoned that if motherhood involves both giving a child DNA and giving birth, and if science can now bifurcate these roles, then we have the condition of having two mothers. For a child to be Jewish, both mothers must then be Jews.

The Relationship between Science and Society

Despite the ambiguity[54] of Jewish genes, genetics is becoming a way of imagining the limits of the Jewish population. The imagination of Jewish genetics, thus, hinges on its utility as a "regulatory technique" (Foucault 1977) in managing the Israeli state's population. While genetic legitimation might only be meaningful if rabbis or others in power recognize it as a verifiable source of knowledge, the potentials of Jewish genetics

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[54] 'Jewish DNA' can be read for personal genetic ancestry testing, even though 'Jewish genes' are often read from areas of non-coding DNA, that is, from genes that do not produce a physical expression in the body. These so-called 'Jewish genes' do not make a difference at all (physically), which means that they are only meaningful if they are given value by those who read them with a specific purpose, as for example if they become the basis for rights to citizenship in the State. This ambiguity affords 'Jewish genes' a heightened hermeneutic potential, allowing them to act as a site for negotiating belonging.

must be recognized for the management of populations through “biopolitics,” the governance of life itself (Foucault 2010; Rose 2007). The prospect of genetic tests to determine Jewishness in Israel of course raises concerns over a reinscription of ethnic essentialisms, entailing a project that could foster a new regime of biopower (Foucault 2009; Rabinow and Rose 2006) at the level of an individual’s genes, with potential for governments cataloging the biological citizen at the molecular level.

Barbara Prainsack has argued that Israel’s permissive laws regarding the use of artificial reproductive technologies can be traced to their utility in tackling Israel’s “demographic problem,” that is, in maintaining a Jewish majority (Prainsack 2006). Moreover, she finds that Israel’s pro-natalist culture rests on a notion of “risk” to the population that serves to bolster the State’s mandate to reproduce the nation at the level of individuals. She (2006:173) writes: “The ‘demographic threat’ that the Jewish majority population in Israel will be outnumbered by non-Jews in the not too distant future provides a context of risk to the discourse on ‘Israeli cells.’” In this context, genetics offers an imagination of instrumental control over the demography of the state.

In the admittedly unlikely eventuality that genetic tests are routinely mobilized to determine rights to citizenship in Israel, the foregrounding of Jewish genes as the basis of Israeli citizenship would be a novel form of governmentality. We would thus be seeing the management and administration of populations and citizens by their states through ethnic genetics. In facing the potentiality of genotyping citizenship it is necessary to read this potential future development as an attempt to imagine a stable future for the State of Israel through the mediated visions afforded by a secular technoscience. Such a development, however, would not be without great contestation, particularly from religious Jews.

When it comes to genetics as a means of testing Jewishness, many rabbis remain skeptical. One rabbi said he believed genetics could be a “consultant” to *halakha*, Jewish law.[55] However, he worried about the newness of the technology, as well as the “binary yes or no of DNA analysis” which is inconsistent with the “cloudiness and argumentation [that] is built into the theocratic polity of Israel.”[56] For other rabbis, concerns remain about the “dangerous eugenic overtones” (Kahn 2010:17). Nonetheless, genetic tests offer the possibility to legitimize those whose Jewishness is often questioned. For example, in one recent case, an Eastern European woman had lived in Israel for twelve years and sought rabbinic permission to marry. She

> “had documents affirming that her paternal grandfather was Jewish, but no proof of Jewishness on her mother’s side save her own testimony. To bolster her claim for a marriage license, the woman went to a commercial gene-testing service and had her DNA analyzed, specifically her mitochondrial DNA.”[57]

The DNA test “tipped the balance in her favor” and the “rabbi granted her a marriage license as a bona fide Jew.” A genetic definition of Jewishness, however, breaks with the traditional *halakhic* law and reconfigures the terms of authentic belonging in the Jewish state.

But genetics is by no means important for all Jews to authenticate their sense of

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[55] Wheelwright, J. (2013) *Defining Jews, Defining a Nation: Can Genetics Save Israel? The Atlantic*, Mar at http://www.theatlantic.com/global/archive/2012/03/defining-jews-defining-a-nation-can-geneticssave-israel/254428/

[56] See Wheelwright, J. (2013) above.

[57] Wheelwright, J. (2013) *Defining Jews, Defining a Nation: Can Genetics Save Israel? The Atlantic*, Mar at http://www.theatlantic.com/global/archive/2012/03/defining-jews-defining-a-nation-can-geneticssave-israel/254428/

belonging. In an article in the *Jerusalem Post* (Chernick 2017), titled 'Should Jewishness be determined by a genetic test?' the author interviewed recent *olim*:

> "In 2011, Boris (pseudonym) found out he was Jewish after his grandmother on his mother's side told him on her deathbed that she was a Jew. She had grown up in a small village in Ukraine and as a teenager was sent to Auschwitz after the Nazis invaded. 'Her entire family was murdered – parents and siblings – and after surviving the war she moved back to Ukraine and made a promise to herself that she would forget her past and Jewish roots. She married my grandfather, a native Ukrainian, a few years later. She never told my mother that she was Jewish. I get the feeling my grandfather knew, but they brought her up as an agnostic. My parents brought me up as agnostic as well, but I always felt there was something more.' Boris, an only child, says he was surprised but not shocked by the revelation. 'A year later, I went on a Birthright trip to Israel and after the visit I knew I wanted to live here. I finished my university studies in Ukraine and came here. I know that I'm Jewish even though I have no documents to prove it. I can feel it and no genetic test will tell me otherwise. If the time comes when I have to take a test, I won't because I know I'm Jewish.'"

For those like Boris, Jewishness is grounded in biographical experience and does not need to be authenticated by an objective science. For him, the truth of a dying grandmother could not be overturned by a genetic test.

In Masha Yakerson's case, however, genetic testing was used as a barrier to prevent access for someone who meets the expansive definition laid out in the Law of Return, but still was not "Jewish enough." For the Yakerson family, the turn to genetics has had rather strange results. Although Masha was ultimately denied access to the ten-day Birthright trip to Israel, her older sister, Dina, reportedly immigrated to Israel as an *olah* in 1990 (Zeiger 2013). For a test intended to measure family bonds and verifiable Jewish heritage, in this case, the turn to genetics actually failed to provide a consistent or accurate measure of familial connections. Rather, it would seem that reliance on genetics might achieve little more than to serve as a flexing of the muscles of state power, a performance of bureaucratic rationality.

Depending on how the state uses this technology, there are several possible ways to interpret the Israeli government's increasing reliance on genetic testing to determine eligibility for citizenship or other rights. It could be a sign of a more restrictive immigration policy that seeks to guard access to the rights and resources of the state. In this way, and in light of the economic challenges faced by many immigrants, it could be an attempt to alleviate unemployment and protect the economy for those already in the country. Advocates have seen similarly restrictive policies advanced to require Jewish verification from those seeking temporary student or work visas as well (Maltz 2014). These temporary visas do not even implicate the full benefits associated with permanent immigration and citizenship and thus suggest that more is at stake than merely guarding resources. One rabbi, who has dedicated his life's work to helping potential immigrants navigate the rabbinic bureaucracy, explained,

> "What we are witnessing is the creation of a culture of xenophobia in the corridors of power in Israel… It manifests itself in the way we treat people born Jewish who don't fit the description of what a Jew should look like" (Maltz 2014).

The tests may also become a means to expand the pool of potential new Jewish immigrants (Maltz 2015) who have verifiable ancestral ties. As seen with the promotion of immigration from the Bnei Menashe community, Jewish genetic tests could become a way to recognize different and broader articulations of Jewish identity and thereby expand the limits of who has legitimate connections to the Jewish community. The potential move to acknowledge legally genetic tests for Jewishness could equally shift some of the authority away from the rabbis, who currently hold much power over the entrance to the Jewish community, and towards scientists, who may be more open to recognizing secular manifestations of Jewish identity.

The varying secular/religious rationalities at play in ‘Jewish genetics’ point to the ambiguity, or outright contradictions between the field of genetic and rabbinic law in determinations of Jewish ethnicity. On the one hand, geneticists make claims that ancestry can be determined on the grounds of DNA sequences passed from father to son, while non-Jewish sperm may be used to father Jewish babies. Meanwhile, a baby without any Jewish DNA could be a complete Jew. Indeed, the majority of contemporary Orthodox rabbis agree that a child conceived with an egg donated by a non-Jewish woman is considered Jewish as long as the fetus is gestated in a Jewish womb (Kahn 2005:184).

In the Orthodox discourse, Jewishness is not a genetic issue, but in the rabbinic imagination, the identity of the birth mother is the determinant of Jewishness. A child conceived with a non-Jewish egg and a non-Jewish sperm would be considered fully Jewish once it is born of a Jewish womb. An interesting contradiction thus appears. While Jewishness can be traced genealogically by reading DNA up the paternal line,[58] as is the case with the Cohanim modal haplotype, with genetic analysis, Jewishness can only be reproduced in the present, that is ‘passed on’ through the maternal line through the process of gestation in a Jewish womb.

In the light of the flexibility of the gendered dimensions of Jewishness, as demonstrated by the ambiguity of ‘Jewish genes’ and the transmission of Jewish

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[58] See Abu El-Haj (2012) for a comprehensive review of the science of Jewish origins.

identities through birth, it might be more productive to think about the category of ‘Jewish genes’ as a discourse that mediates collective visions of peoplehood depending on what it achieves rather than on where it fails. The epistemic qualities of ‘Jewish genetics’ – the validity and consistency – can be viewed as secondary to the event that is achieved in the political present. In this line of thought, ‘Jewish genetics,’ as a technical iteration of identity politics and a genre of discourse that mythically reinforces the imagination of the singular nation, cannot be meaningfully discussed without recourse to the specific moment within which the epistemic value of claims to genetic identity affords utility as an achievement as a matter-of-fact in society, that is to say, within the relations of power between citizens and their government, as well as between those who are excluded.

The persistence of ‘ethnic genetics’ in public discourse must, therefore, be regarded as a reification of the Jewish nation as a unified entity. Indeed, the epistemic value of ‘ethnic genetics’ and the political milieu appear to be “co-produced” (Jasanoff 2004), which is to say that they beget and stabilize each other. Simply put, without a Jewish state in the Levant, questions over ‘Jewish genes’ would probably hold a very different kind of importance and interest. Crucially then, ethnic genes may serve to make states into more stable political realities, while states simultaneously create the conditions for the meaningful misrecognition of genetic material as bearing an essential identity. The potential for ‘Jewish genes’ being a measure of inclusion in Israel makes this patent, but regardless as to what happens in Israel in the coming years, the imagination of ‘Jewish genes’ is certainly growing and gaining traction, in both Israeli public discourse and the state’s political imaginary.

In facing the potentiality of genotyping citizenship, it is necessary to read this development as an attempt to imagine a future for the Israeli state through the visions mediated by a secular technoscience. This in itself is not novel, since secular visions of the Israeli state have previously been described in relation to science and technology, as for example with David Ben-Gurion's "scientific utopianism" and his "million plan" to bring a million Jews to Palestine (Barell and Ohana 2014), or with the Israeli geneticists who in the 1950s applied their science to establish a national identity and confirm the Zionist narrative (Kirsh 2003). Kirsh (2003) finds that Israeli geneticists unconsciously internalized the Zionist narrative, and Zionist ideology is evident in their genetics research, which evidences their beliefs of the origins and history of the Jewish people. But with the latest possibility of genetic tests being used to decide on citizenship, a transformation in the very definition of the Jewish political subject itself is at stake. At issue, then, is the possibility of a novel form of governmentality in the distribution of citizenship. But regardless of the validity of genetic tests for Jewishness, this possibility itself entails a unique iteration of Jewish political thought, a geneticized articulation of a secular Zionism that foregrounds the subject's genetic code in the imagination of civic inclusion.

In the next chapter, I focus on one of the key institutions that have made the discourse of Jewish genetics possible. I examine the National Laboratory for the Genetics of Israeli Populations ethnographically, asking how this science of identity is produced. That is to say, how does Jewishness become a category of analysis in genetic research, and how does this research foster an imagination and discourse of a genetic collectivity?

The Israeli Biobank: A National Project?

The National Laboratory for the Genetics of Israeli Populations is Israel's National biobank, a key resource for research on the genetics of Jewish populations. Herein I describe the origins, aspirations, practices, and the current state of the biobank, and I ask what kinds of moral communities and visions of human collectivity are imagined through the biobank. I find that the Israeli biobank does not explicitly foster or emphasize exclusive Jewish peoplehood but is rather more substantively part of global biobanking trends, which are now becoming surpassed by genomic databasing and big data projects. I find that population genomics of Jewish groups in Israel is now being transformed by emerging trends in personalized medicine with the emergence of genetic data as a site of reified economic value.

The National Laboratory?

"It must be a mistake," says David Gurwitz, head of the National Laboratory for the Genetics of Israeli Populations (NLGIP) at the Sackler School of Medicine at Tel Aviv University (TAU). I had told David of the recent news article reporting Benjamin Netanyahu's (then Israeli Prime Minister) announcement that genetic tests might be used for determinations of immigrants' Jewishness. Judaism, David told me emphatically, is a religion, and cannot be determined by a genetic test. If only it were so simple, I thought. I knew that popular discourses of genetic citizenship were too weighty to be abolished by a something trivial and inconvenient like scientific invalidity. The discourse of genetic citizenship, rather, exceeds the science; the 'bio-nation' discursive all the way down.

This chapter tells of my ethnographic disappointment at the NLGIP. In the context of the wide circulation of gene talk and the potential biopolitical role of genetics in Israeli society as described in the previous chapter I had expected the NLGIP to be replete with research and discourse of the genetics of Jews. I was expecting to find work on the genetic nature of the Jewish nation and the genetic basis of a return to Zion. But my expectations were not met. It turned out that the NLGIP is far more a part of the fabric of Israel's burgeoning secular technoscientific landscape. It is concerned with an unmarked global science and the imagined move towards a future era of precision medicine. The Zionist pioneer at the NLGIP, rather than a religious Zionist fanatic, is the secular scientist pushing the boundaries of global biomedical progress forward. This is the Zionism of 21st-century secular global modernity. Tel Aviv, the global scientific hotbed.

Within a month of arriving in Tel Aviv for a year of fieldwork, I had sent an email to David to request a meeting. It was a hot humid August, and I was already on TAU campus attending a one-month Hebrew language course. David responded to my message within a day, saying that he would likely be of little help to me since I should probably be speaking to genetic counselors, but that he would be glad to meet with me nonetheless. I had harbored expectations that this 'National Laboratory' would be the site *par excellence* for apprehending the collision of national imaginaries and basic science, so I disregarded his discouragement; I presumed he didn't see the kind of anthropological connections I was pursuing. We scheduled a meeting and I showed up at his office in the afternoon the following week. After navigating the labyrinthine corridors of Sackler for a few minutes, I found David's office. It was tucked in the far corner of the building on the seventh floor, beside his small wet lab, and adjacent from the biobank storage room.

After arriving at David's office I introduced myself and explained a little about my background in biology and anthropology. While I initiated the conversation in Hebrew, after he responded several times in English, I moved to English. On several occasions, I got the impression that English was the appropriate language for discussing science with outsiders. English, after all, is the *lingua franca* of global science. I told David I was interested in studying the biobank that the NLGIP manages from an anthropological perspective, with a focus on ethnicity and national identity. After a half hour of conversation about the research activities of David's lab, it was clear that I would be able to join the lab and 'help out' with some experiments. I enthusiastically volunteered to offer my laboratory skills as a way in. More specifically, one of his graduate students, Keren Oved, was working on a neurobiology problem that I might be able to assist with since I had some expertise in the area.

I followed up with an email the following day, and on our next meeting, David introduced me to Noam Shomron, a younger, up-and-coming, faculty member, with a larger genomics lab in the same building. Noam had recently returned from a postdoc at MIT and he was now building up his own lab. Noam, David told me, also has an interest in the field of science and society as well as that of bioethics in relation to genomics. I felt like I had landed on my feet, having secured access to the National Biobank as a visiting scientist and having being introduced to another important player in Israeli medical genetics. I surely had gained access to a rich site where the melding of Zionist ideology and molecular genetics would obtain in ethnographic richness. That was my hope and expectation.

About a week later I met with Noam in his lab, which was much larger than David's, but which was generously decorated with oil paintings on canvas, mostly of animals or natural landscapes, which, I found out later, were all painted by Noam. I found Noam in his office, where he offered me a seat and asked me to explain a little about my interests. He listened attentively and patiently as I explained my research interest in the context of my biography, eventually getting to how I ended up studying Israeli society. I told him that I was interested in the relations between genetics and broader society, and in particular, the ways in which racial and ethnic identity play out in the management of genetic data. When I eventually paused for his response, he said conclusively "I think you've come to the right place," before giving me an overview of the lab's work, and suggesting some ways I could get involved. Noam made me feel welcome right away and told me about the lab's ambitions and overseas collaborations. For example, he showed me a small biomedical device he had on his desk, only slightly bigger than a matchbox, which he told me had "on loan" from the manufacturers. It was a prototype for the latest high-speed portable genomic sequencers, and his lab was trying it out. Noam's openness, confidence, and willingness to invite me into his lab impressed me, even flattered me, but crucially, I was convinced that his lab would be a place where I would be able to see the management of genetic data of identified ethnic populations.

There was also an obvious way for me to integrate into the lab. Since David had already paired me with Keren, a shared Ph.D. student of both Noam and David, and with whom I would work on a project investigating the molecular basis of resistance to antidepressant therapy (specifically SSRIs), Noam offered me bench-space sitting next to Keren. I sat at a small desk, between Keren and another Ph.D. student. I began attending the lab in the morning, sitting and working on my laptop, and listening to the Hebrew conversation in the lab, and asking lab members what they were doing or to explain a little about their projects. The conversations in the lab were usually in Hebrew, and I participated and conversed with the lab members in Hebrew (many of whom didn't speak good English), but Noam and David usually spoke to me in English. Though I had secured excellent access to the basic research practices of the lab, it was not clear how the Israeli biobank, and the diverse genetics research in Noam's lab, fitted with my ambitious theoretical questions about the molecularization of ethnicity and the discourse of Jews as a biological nation. I began to wonder if I would find what I was looking for, that is, the imagination of the national collective shaping the handling of genetic data.

In this chapter, I will give an overview of the daily laboratory practices and research projects in Noam and David's labs, with particular attention to the broader context of global science that structures the aspirations and the imagined audience of the research. Before outlining the laboratory practices, however, a note on the wider social and demographic context that frames this Israeli biobank.

Biological Nation?

Israel is a country of 8 million people with a relatively equal balance of men and women and with a typical distribution across age groups for a growing society in a developed country (See Figure 1).

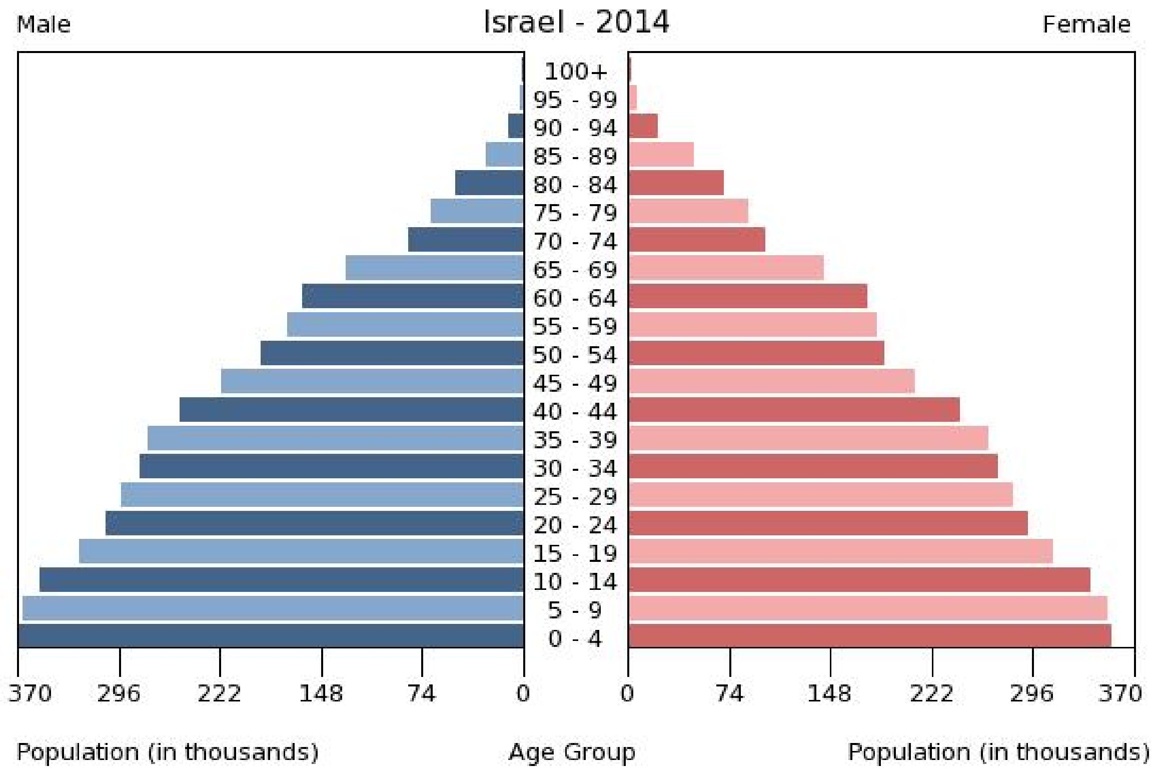

Figure 1. Israel Population Pyramid. A population pyramid illustrates the age and sex structure of a country's population and may provide insights about political and social stability, as well as economic development. The population is distributed along the horizontal axis, with males shown on the left and females on the right. The male and female populations are broken down into 5-year age groups represented as horizontal bars along the vertical axis, with the youngest age groups at the bottom and the oldest at the top. The shape of the population pyramid gradually evolves over time based on fertility, mortality, and international migration trends. Taken from the CIA World Factbook, Nov 22 2015, online at https://www.cia.gov/library/publications/the-world-factbook/geos/is.html

According to a recent report, the Jewish population of Israel stands at about 6.3 million people (75% percent of the population), with the Arab population being about 1,746,000 (21% percent). There are also about 366,000 (4.4%) people who are either non-Arab Christians or who are listed as “no religion” in the civil registry.[59] Unlike other Middle Eastern states (such as Qatar, UAE, Iraq, or Yemen) in Israel, it is the

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[59] “Israel saw 35% increase in *aliyah* last year, stats reveal,” YNet News, accessed Nov 22 2015, online at http://www.ynetnews.com/articles/0,7340,L-4698949,00.html

demographic majority (Jews) that can be considered the hegemonic, ruling group. This fact is significant in considering the role of biobanks in providing a way of imagining the national cohort and the limits of belonging. The demography of the State's territory, and indeed the Occupied Palestinian Territories (under the administrative control of Israel with the support of the Palestinian Authority) also need to be recognized in analyzing any representation of a naturalized population. Indeed, since the 1947 partition plan, Jews, "with 32 per cent of the population . . . were awarded 55 per cent of the land and 80 per cent of the coastline" (Anderson 2015:34). In this arrangement "Arabs, with 68 per cent of the population, were allocated 45 per cent of the land" (Anderson 2015:35). While the birth rates and rates of immigration have varied since then, "heavy Jewish immigration and high Palestinian birth-rates have ended in the rough parity at which they stand today—Jews leading Palestinians by a dwindling margin, Palestinians soon to overtake them" (Anderson 2015:35).

In this context, the idea of a 'national biobank' made me suspicious about the population being measured and cataloged, especially for those individuals concerned by the ever-growing powers of surveillance available to states. I had expectations that the politics of science would be readily apparent and legible at the level of the laboratory. Having read the debates about Jewish origins, having understood the demographic battle the state wages to maintain a Jewish majority, and knowing that the politics of science that makes claims about the connection Jews have with the land of Israel/Palestine, I was primed to see nationalism in the daily practice of science. But my expectations were not met: although the work I observed in the lab depended on certain racial or ethnic categories, it was not the case that I could identify a clear moment when the framing national context swayed the research in a particular direction or became an identifiable influencing factor in scientific reasoning. This is a crucial ethnographic finding that has relevance for the methodology of studying science and society. It also problematizes the idea of local 'site' when studying the globalized discourses of science.

Ultimately, I found that the discursive social life of genetics and Jewish identity vastly exceeds the science that underpins it. The National Laboratory, I realized, was like a genetic Holy of Holies: a hollow, empty space that is attributed a powerful truth-value, coordinating a set of mythical beliefs about the nature of the Jewish nation. Inside the labs, however, there was no Jewish essence to be found. Not only was there no research focus on Jewish origins or the genetics of the Jewish nation, but the work of the biobank and the labs I visited predominantly focused on contemporary trends in biomedicine and an unmarked global rush to precision medicine. The aspirations of the labs are toward global science, rather than Jewish nationalism. In the idiom of Ram (2008), I was in 'McWorld,' and not 'Jihad.' This was the world of secular global modernity, not a mythology soaked ethno-cult. Despite the sustained presence of genetics in the imagination of Jewish unity, in both the media and discourse over immigration, the genetics research I observed in the labs fell far short of delivering epistemic grounding and evidentiary footing for the bio-nation.

This ethnographic shortcoming became progressively apparent during my time at the NLGIP, and I had the sinking feeling that my fieldwork was falling flat. However, I kept several questions in mind: is this a facility that furthers national biometrics or surveillance of populations? Does it serve to manage or control the demographic nature of the population, or serve to project an image of the population in service of state building? Is the biobank a biometric apparatus of the state, serving to survey the population? Lebovic (2015:843) recently defined biometrics as “the archiving of biological data, based on the surveillance and control of bodily images in public space,” and adds (2015:842), poetically,

> “The physiognomy of our age has been secularized, automatized, digitally coded, visually metaphorized, privatized, and depoliticized. In other words, the wide spread of biometric systems proves that the modern aestheticization of politics, which lasted from the eighteenth century to the twentieth century, has turned into a system of hidden and fragmented biological control.”

Similarly, in relation to the biopolitics of the body, Comaroff and Comaroff (2016:47) assert that “[i]n the mass-mediated *imaginaire*, science has come to be the panacea for the policing of everything, but despite its mythologizing in popular discourse, its methods, for all their utility, do not remove the doubts, deficits, and indeterminacies that beset enforcement everywhere.” These contentions, of course, posit a bifurcation between the mythologizing popular uptake and circulation of scientific imaginaries, like the bio-nation, and the application of scientific methods in managing populations, ‘biopower.’ In other words, there exists an uncoupling of the circulatory semiotics of science as biopower from the instrumental capabilities its technologies achieve in practical terms, even while the material and the semiotic are two sides of the dialectic of the discourse of power and knowledge. Following this reading of science as both mythology and instrumental control, a national biobank ought to be suspiciously interrogated and read to coalesce such potentialities: a biobank may be a direct or indirect effort to control populations.

With these insights in mind, I became attuned to the biopolitical potential of the apparatus to be a key line of inquiry. I considered whether the biobank could be read as a nation-building device for a technocratic and secular society. But it became more difficult to make the connection between the basic science I observed and the potential downstream outcomes. As the question that I brought with me to the field was how the biobank fits with previous imaginations of the body as a site of national instantiation, and since the ethnographic character of the laboratory life did not yield the expected rich discourse of nationalism, I began to investigate the genealogical origins of the biobank, its history, practices, and imagined purpose and utility. Ultimately, this expanded the frame of my research to consider the global context of biomedicine.

This chapter has two aims. First, it asks in what ways human ethnic and racial identities are a factor in the National Laboratory for the Genetics of Israeli Populations. I will discuss the way in which the national biobank is a nationalist project, and I describe what ethnic distinctions are made through the establishment and practices of the biobank. Specifically, I show how the biobank's national character is configured towards imaginations of a distributed global scientific community. More precisely, I show what kind of community, particularly moral community, the biobank constitutes and what elements of natural peoplehood are refracted through the biobank. Secondly, this chapter seeks to elucidate the relationship between the ethnonational context of contemporary Israel and the way in which ethnic groups are made or unmade, or become visible or disappear, in the laboratory practices and functional genomics research I observed.

I begin with a vignette from the work of one of Noam's Master's students, Yaron, whose work investigates genetic markers for Parkinson's in Ashkenazi Jewish populations. The purpose of this case is to emphasize the precise way in which ethnicity comes to both matter, and not matter, in this kind of basic genetic research.

“Medical implications from investigation of the Jewish exome”

One morning, while sitting at my desk writing an op-ed essay for the journal *Genetics Research*, which Noam edits, Noam asked me if I’d like to join in a lab meeting. I grabbed a chair and joined the lab members in the computational ‘dry’ bench area. I introduced myself to the group of students in Hebrew, some of whom I hadn’t yet met, and then the Master’s student, Yaron, began his presentation. Yaron was working in the area of bioinformatics, and his lab-talk was highly relevant to my interest. He presented on the medical implications of an investigation of the ‘Jewish exome’ (coding genes with a possible biological function). The talk was in Hebrew, but the PowerPoint slides and graphs were in English. This, I later found out, was usual in scientific presentations in Israel. There was an air of casualness to the presentation, which I would later learn to be typical of Israeli life, and which is characteristic at Tel Aviv University. Yaron was wearing flip-flops, cargo shorts, and a sleeveless t-shirt, with headphones sitting on his neck while he presented to the group. His talk explained how populations and ethnic groups are measured and distinguished within population genomics, as a way to identify biomarkers that could help better understand the development of Parkinson’s. His talk was titled “Medical implications from investigation of the Jewish exome.” The presentation was a summary of the findings of the research he had done for his master’s thesis.

The study was an analysis of the genomic data from a cohort of 74 Ashkenazi Jews aged 39-85, 54 of whom had Parkinson's disease. The goal of the study was to identify possible genetic markers that could lead to a better understanding of the genetics of the disease. If you can find genetic markers that are present in the Parkinson's patients that are absent in the healthy patients, then you may be able to learn more about what genes help cause the disease. The data for this research, however, did not come from the biobank. Since it is too expensive to sequence all the individuals in the biobank, and since there is poor medical information about the biobank participants, the data for this study came from an open-access database called 1000 genomes (on which it is possible to freely download the genomic data of 1000 individuals' genomes), and EXAC – a database of exons (coding DNA) of populations. One of the first few slides of Yaron's talk dealt with sorting out the participants or seeing where the participants lie as a related genetic cohort.

I was surprised to see that the individuals were broken into distinct racial groups at the beginning of the analysis. In analyzing the genetic variants that were present in the Ashkenazi population, Yaron compared their incidence to both European and African 'reference populations.' The boundaries, or identities, of the racial categories, are neither challenged nor asserted here. Rather, the prior identities of these groups are used as a 'reference' within which to situate the new variants identified. I was interested in how and why groups can be seemingly easily formed around racial identity when the doxic consensus is that race is arbitrarily and socially constructed, that humans are vastly more genetically similar than they are different from one another, and that science that reinscribes the idea that racial groups can be segregated in biological terms is dangerous by virtue of its implications in naturalizing difference. I wanted to know why racial reference populations were necessary.

With genomic readings, I learned from the talk, it is not an essential, visible, characteristic that determines within which racial group an individual sits. Nor is it self-identification that determines which reference group one belongs to. Rather, individuals are clustered by the small genetic differences that they possess, and the likelihood that individuals are associated, historically, by the degree to which they share these differences. You could say, therefore, that having similar differences to others in one's own racial group is the basis for comparisons across groups. Consequently, the natural clustering of variants leads to the labels from the geographic origins of these individuals. However, these differences are not necessarily phenotypic, that is, they may not be visible, or physically expressed, differences.

These variants may not have an important biological function at all, but rather, simply function as traces of history. By establishing racial groups as reference populations for these genetics studies, the 'difference of difference' is compared, such that the high degree of genetic similarity is somewhat occluded. But racial type or geographical background had no further importance or emphasis in Yaron's research. He was only interested in the role that variants may play in the development of Parkinson's. He was not investigating the legitimacy of categorizing groups based on racial categories. If, for example, he found a variant that could be traced to the development of a particular biological function that is important in the development of the disease, it would not matter what race or ethnicity the individual who has the variant is. The important finding would be that the genetic marker could be used to predict the disease in an individual, regardless of their origins or identity. Being in a particular ethnic or racial group, could, however, be helpful in deciding whether to screen for the specific variant, based on the probability of individuals with a certain geographical background. To put this work on the molecularization of ethnicity in the context of the history of medicine, I will now outline the origins of the biobanks.

Origins of the Biobank

Diversity is valuable for the biobank. The NLGIP biobank is situated in a context of a diverse society, and the NLGIP acknowledges the diversity of the Israeli population, as Jews have immigrated to Israel following its establishment, arriving from countries as diverse as Georgia, India, Iraq, Iran, Turkey and Yemen in Asia, as well as Algeria, Libya, Morocco, and Tunis, in North Africa, and, more recently, Ethiopia. This ethnic diversity made Israel unusual in its genetic makeup. While there are other countries, like India, China, and Brazil, and to some extent, the United States, that are also distinct in having an exceptional mix of varied populations from diverse ethnic backgrounds (Gurwitz *et al.* 2003:3), Israel is special. There are lots of different immigrant populations in a very small country, geographically speaking, but the immigrant Jewish populations are of unique composition since the Jewish prohibition against intermarriage with non-Jews has produced hundreds of years without much admixture. David has written that this makes Israel a unique “living laboratory” (Gurwitz *et al.* 2003:4).

The NLGIP was established in 1994 to be a material resource for studies of human genomic variation. It was established with a grant from the Israel Academy of Sciences and Humanities to be the national human cell lines and DNA research biobank of Israel.[60] The repository consists of human DNA samples and immortalized white blood cell lines, making a collection from over 2,000 donors,[61] representing the large variation of Israeli populations. The donors include unrelated individuals from diverse genetic backgrounds, including European, Asian, African and Middle Eastern Jewish ancestors, as well as Arab groups: Palestinians, Druze, and Bedouin (Gurwitz *et al.* 2003:2).

The NLGIP is located at the Sackler Faculty of Medicine at Tel-Aviv University campus, in Ramat Aviv, which is a wealthy suburb a few miles north of the city center. The NLGIP consists of a biobank of human cell lines and matching DNA samples of donors from the “Israeli populations” (Gurwitz *et al.* 2003:2). Representing the large ethnic variation and unique nature of the Israeli populations, the “NLGIP focuses on collecting, establishing and maintaining human B-lymphoblastoid cell lines and matching DNA samples from healthy donors representing the various Jewish and Arab ethnic groups in Israel” (Ibid). The activities of the NLGIP are supervised and approved by Tel-Aviv University’s Institutional Review Board.

The NLGIP is an internationally networked institution. It is affiliated with the USA National Institute of Health Pharmacogenetics Research Network (PharmGKB) and the European Biobanking and Biomolecular Resources Research Infrastructure (BBMRI) and has contributed to the France CEPH Human Genome Diversity Cell Line Panel and to the US-based Coriell Cell Repositories (Ibid). Moreover, the NLGIP is a member of

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[60] NLGIP website, National Laboratory for the Genetics of Israeli Populations, http://www.tau.ac.il/medicine/NLGIP

[61] National Laboratory for the Genetics of Israeli Populations, Catalog, http://www.tau.ac.il/medicine/NLGIP/catalog.htm

the EuroBioBank,[62] a network of worldwide biobanks that provides human DNA and cell and tissue samples for the scientific research community working on rare diseases. EuroBioBank is the only network specifically dedicated to rare disease research in Europe. It has about 130,000 samples available, which can be requested via the online catalog. The EuroBioBank Network is composed of 25 members: 21 biobanks from 9 European countries (France, Germany, Hungary, Italy, Malta, Slovenia, Spain, United-Kingdom, and Turkey), but also Israel and Canada.[63]

The Israeli biobank accepts requests by researchers from around the world for samples, which will be mailed to them at a modest cost. For example, each growing cell line costs US$150, the price for a 10 μg DNA sample is US$45, and 5 μg DNA sample costs US$30 (excluding shipping charges).[64] But what is the material infrastructure of the biobank?

The Materiality of the Biobank

The NLGIP consists of the laboratories (assemblages of spaces, tools, and people) that manage the biobank and the sample storage facilities. The biobank storage area consists of a dedicated room that contains several round padlocked steel flasks that are kept full with liquid nitrogen. There are also two smaller back-up vessels, which are temperature-controlled and alarmed to ensure no accidental thawing and damage. The

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[62] "The EuroBioBank Network is currently composed of 25 members, of which 21 biobanks from 9 European countries (France, Germany, Hungary, Italy, Malta, Slovenia, Spain, United Kingdom and Turkey) as well as Israel and Canada," EuroBioBank website, accessed Nov 16 2015, http://www.eurobiobank.org/en/information/info_institut.htm

[63] EuroBioBank Network, http://www.eurobiobank.org

[64] National Laboratory for the Genetics of Israeli Populations, Catalog, accessed Nov 30 2015, http://www.tau.ac.il/medicine/NLGIP/catalog.htm

biobank also contains DNA samples from donors, which are stored in a regular freezer in the cell culture lab since DNA is stable in water at 4 degrees centigrade.

During a meeting with David, I asked about the biobank, how it works, and what it is exactly. He obliged and proceeded to tell me about it at length. Given what I knew of current trends in precision medicine, I asked David if he wanted to sequence the DNA of the samples so as to correlate the medical histories of the donors with the genetic profile of the samples. This, I thought, would be the obvious next step to gain a better understanding of the genetics of the populations and the relationship between genetics and disease. He said, "no, it would be too costly." I then asked if he would be able to put the medical data online, even anonymized, so that other researchers could do some analysis. He said that wouldn't be possible because of confidentiality issues. Each individual sample has an identifier code, which corresponds to a file in a set of folders that are securely stored in David's office. It wouldn't be ethical to publish these private data. Occasionally, however, researchers that have been working with samples that the biobank has sent out find a rare mutation and do want to contact the patient to find out about their medical history, but David doesn't let them do this.

I asked David what kind of medical information he has on the participants. "It's not rigorous medical data," he told me. Rather, just a consent form with age, height and weight (to calculate BMI), smoking habits, any volunteered named chronic conditions and a very brief family history. The samples are therefore donated with minimal information: just age, ethnicity, and basic biometrics. David noted that there was a lot of interest in the biobank in the 1990s and early 2000s, but that they stopped collecting samples two years ago. After asking David several questions about the biobank, he referred me to a chapter written specifically about the biobank titled "The Israeli DNA and Cell Line Collection: A Human Diversity Repository," which was published in a volume titled *Populations and Genetics: Legal and Socio-Ethical Perspectives* (Knoopers 2003). I will relay some of the details here.

In the 1990s there was a call for a worldwide survey of human genetic diversity (Gurwitz *et al.* 2003:4) initially by the Human Genome Diversity Project (HGDP). The main arguments were that the Human Genome Project would not do justice to the human diversity of the world and that there was a need to also better understand the varying degrees of human susceptibility to disease and historical migrations. The National Laboratory for the Genetics of Israeli Populations (NLGIP) was therefore established in 1994 "in light of the awareness to the subject of genetic diversity since the 1950s and the incoming of the Jewish immigrants, and under the influence of the HGDP ideas." The biobank is thus self-imagined as a participant in a global effort to characterize human genetic diversity. In other words, it is a project of global genetic comparison. The laboratory was initially funded by the Israel Council for Higher Education and "was established under the auspices of the Israeli Academy of Sciences and Humanities." This is the reason, David told me, that it is called the 'National Laboratory,' the initial sponsors being a national scientific organization. It was not, therefore, an intentionally nationally motivated project in the ethnic sense.

The NLGIP was initially located at Tel-Aviv University and was first headed by Prof. Batsheva Bonne-Tamir, then the Head of the 'Shalom and Varda Yoran Institute for Human Genome Research' at Tel-Aviv University. The laboratory was envisioned as (Gurwitz *et al.* 2003:5) a "national repository for human cell lines and DNA samples representing the large variation of Israeli and several Middle Eastern populations." Thus far, the laboratory has over 2,000 immortalized human cell lines, representing individuals and families of 20 ethnic backgrounds (Table 1).

Ethnic Group	**Number of unrelated donors**
Jewish	
· Ashkenazi (Central European ancestry)	466
· Ethiopian	72
· Georgian	24
· Iranian	76
· Iraqi	103
· Kuchin (India)	85
· Libyan	89
· Moroccan	150
· Sephardi (Turkey and Bulgaria)	166
· Tunisian	29
· Yemenite	159
Bedouin	58
Druze	79
Palestinian	117

Table 1. Catalog of DNA Samples and Cells of the Israeli National Biobank. All donors are healthy adults. A matching B-lymphoblastoid cell line is available for each DNA sample. Accessed online, Nov 22 2015, at http://www.tau.ac.il/medicine/NLGIP/catalog.htm

The NLGIP has a clear ethical policy on the biobank website. It states that "the participating researchers must always respect the humanity of the sampled individuals and the cultural integrity of the sampled populations," that "[i]nformed consent must always be obtained from sampled individuals (or their parent/guardian)"; that "[t]he confidentiality of the sampled individuals must always be protected"; that "[r]esearchers must strive to avoid misuse of the collected data"; and that "[r]esearchers should actively seek ways in which participation in their studies can bring benefits to the sampled individuals and their communities."[65] By conjoining respect for humanity with anonymity, the biobank's policy emphasizes that it is to serve the world's people in the most general way and return benefits to both specific individuals and communities. The biobank thus is both a goodwill effort to bring about health improvements for humanity in general, and, in doing so, it also imagines a shared common humanity in the form of a global scientific community of participation. In this regard, its goals are beyond any single ethnonation, but it instead provides biomedical knowledge of diverse populations.

Collecting of Samples

Samples that were donated by patients or healthy individuals were collected in clinics around Israel and prepared for storage at the biobank. Blood cells prepared from the donors consist of white blood cells, B-lymphocytes. These cells may be used for the study of gene expression, for measuring mRNA (the chemical signal that causes the cells to make a certain protein) and specific protein levels, or for specific assays, such as genetic, biochemical, and cell biology studies. Some studies include gene transfection, the alteration of phenotypic properties of the cells, or measuring the effects of hormones or drugs (Gurwitz *et al.* 2003:6). Samples collected do not immediately fall under the full control of the biobank. Contributors may limit the distribution of their cell lines, they may demand a request before any transfer of the contributed cell lines is made, and they may benefit from a free backup service, whereby the biobank holds a secure sample of

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[65] National Laboratory for the Genetics of Israeli Populations, Policy, http://www.tau.ac.il/medicine/NLGIP/policy.htm

the tissues donated.[66] Cell lines donated are intended for *research purposes only*, and anyone interested in using cell lines for commercial endeavors must obtain written consent from the individual contributor first. However, the personal details of the cell line donors remain confidential.

All of the donors are adult Israeli citizens, over 18 years old, "that have given written informed consent for the study of their genetic material (DNA or cells) for biomedical research."[67] The listed ethnicity of samples was "self-defined by the donors."[68] For the self-defining Jewish donors, their geographical background "is defined according to the place of birth of their four grandparents." The website states "[f]or example, Iraqi Jewish donors have four grandparents who were born in Iraq."[69] The gender is also available for all donors, and some data for the age of participants.

The benefits accorded to participants are therefore the understanding that they are contributing to the advancement of science and medicine and that they could benefit from medical experiments on their individual samples later on if they develop a specific disease that could be better treated through experiments on the cells or DNA donated. Donors are not afforded an immediate benefit. The NLGIP acknowledges that the establishment of the biobank raises ethical issues about participation and remuneration, but reports "the IRB prohibited any imbursement (monetary or other) in return for blood sample donations, demanding they must be donated on a full voluntary basis" (Gurwitz *et*

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[66] National Laboratory for the Genetics of Israeli Populations, Contribution, http://www.tau.ac.il/medicine/NLGIP/contrib.htm

[67] NLGIP Catalog, accessed Nov 29 2015, http://www.tau.ac.il/medicine/NLGIP/catalog.htm

[68] NLGIP Catalog, accessed Nov 29 2015, http://www.tau.ac.il/medicine/NLGIP/catalog.htm

[69] Ibid.

al. 2003:7). In order to increase the amount of voluntary, unpaid, donors, the NLGIP thought that individuals already undergoing a routine blood test might be easily willing to give an additional tube for the biobank. Blood samples were thus collected routinely at community clinics in Tel-Aviv, and across Israel. Druze samples, for example, were obtained from the Carmel region of Israel, while Bedouin Arabs' samples were taken from the Negev region, in the south of the country (Gurwitz *et al.* 2003:9).

Use of Biobank Samples

The biobank at the NLGIP has made samples available to researchers around the world for scientific research. Requests for samples can be made through the NLGIP webpage. All of the order requests received by the NLGIP thus far have been for unrelated individuals. This surprising finding denotes a lack of research interest in ethnic-specific groups, but speaks to

> "the more intensive interest of the ordering researchers in human genome variation studies, such as allelic distribution of polymorphic genes across various ethnicities, as well as looking at mutation frequencies and looking for new mutations, rather than more elaborate human genome research, such as haplotype distribution analysis" (Gurwitz *et al.* 2003:9).

This is to say that the predominant interest in the biobank is not an interest in ethnic genetics, ethnic origins, or ethnic-specific diseases *per se*. Rather, it is the diversity of variation across individuals that has interested researchers. The most frequently ordered samples from the biobank DNA, however, are for Ashkenazi Jews (~40% of all DNA samples requested). This is somewhat surprising, since approximately one-third of the NLGIP samples come from families within specific and designated Israeli and Middle-Eastern populations, making it a good resource for data about specific Middle Eastern populations, their genetic structure, relatedness, and historical origins. These issues, apparently are less interesting to genetics researchers around the world. In addition to blood samples, which are made available to researchers for experiments, matching genomic DNA samples can be requested for each of the cell lines (Gurwitz *et al.* 2003:9). DNA is preferentially ordered over cells, as it is easier and cheaper to ship pure DNA than blood, which can carry viruses and is more sensitive to damage.

Many scientific studies have emerged as a result of the samples sent out. A Google Scholar search for “National Laboratory for the Genetics of Israeli Populations” revealed that 260 academic publications have referenced the Biobank, with an average single figure output of articles referencing the biobank each year since its inception in 1994. Perhaps the most noteworthy research to emerge from the biobank samples in relation to the genetics of Jewish identity is a study led by Michael Hammer (the University of Arizona), and colleagues, that studied haplotypes (genetic markers) constructed from Jewish Y-chromosomes. They traced the paternal origins of 1,371 males from both Jewish ethnic groups and non-Jewish groups from similar geographic locations (Gurwitz *et al.* 2003:12). The study investigated whether Jewish Y-chromosome diversity revealed a common Middle Eastern source population or whether Jewish Y chromosomes reflect mixture with neighboring non-Jewish populations (Hammer *et al.* 2000). The study concluded that despite their long-term displacements and movements in different countries, and despite isolation from other Jewish groups, “most Jewish populations were not significantly different from one another at the Y chromosome genetic level” (Gurwitz *et al.* 2003:12). Such studies are thought to be valuable in their ability to inform on Jewish history and migrations and the relationships of separation between Jews and their host populations over history. The political import of this work is to emphasize the genetic relatedness between diaspora Jewish groups, which can bolster the imagination of the bio-nation. A second major study that the NLGIP provided samples to was the Human Genome Diversity Project (HGDP) (Gurwitz *et al.* 2003:14).

Other studies that used the biobank samples that describe the Jewish population structure include: “Counting the founders: the matrilineal genetic ancestry of the Jewish Diaspora” (Behar *et al.* 2008); “MtDNA [*mitochondrial, maternal, DNA*] evidence for a genetic bottleneck in the early history of the Ashkenazi Jewish population” (Behar *et al.* 2004); “Reconstruction of patrilineages and matrilineages of Samaritans and other Israeli populations from Y-chromosome and mitochondrial DNA sequence variation” (Shen *et al.* 2004); “Distinctive genetic signatures in the Libyan Jews” (Rosenberg *et al.* 2001); and “Jewish and Middle Eastern non-Jewish populations share a common pool of Y-chromosome biallelic haplotypes” (Hammer *et al.* 2000). The lead authors on these articles are based at Universities in Haifa, Palo Alto, and Tel Aviv.

Although the biobank is housed in the Sackler School of Medicine, research on Jewish genes and the genetic basis of disease does not primarily use the genetic data available through the biobank, nor are the labs associated with the biobank the main producers of research on Jewish population genetics. Further, these kinds of population studies that draw on the biobank are becoming less common as the labs move toward computational analysis of databases. Since it still costs a lot to sequence the full genome of each sample, and since the biobank does not have medical records to couple to the samples, researchers now preferentially choose to download data freely available from other genomic databases and analyze the relationship between disease and genetics using computational methods. Consequently, the Israeli biobank is being relatively underused compared, for example, to the level of genomic analysis that Noam's lab is doing with genetic data downloaded from databases. This development renders the biobank somewhat dormant, as databases become more accessible and offer greater amounts of data.

Based on my observations, the Israeli biobank does not *directly* produce a narrative of Jewish biology or genetic descent, nor indeed any special aspect of Jewish exceptionalism or uniqueness. Rather, it was conceived as a humanitarian resource as part of global biobanking efforts to categorize human genetic diversity. It is important to emphasize that the biobank was established in the period of relative optimism that followed the 1993 Oslo peace negotiations, and the inclusion of a diversity of Arab and Jewish ethnic groups in the register may have been influenced by a more hopeful moment for the possibility of bi-national co-existence. The biobank resources, have, however, been used to bolster historical narratives about Jewish migrations, but these studies cannot be traced to the explicit intentions of the biobank's founders. Moreover**,** the Israeli biobank does not engage in outreach or public demonstrations, nor is it open to visitors. Its material resources remain sequestered in an inaccessible and unadvertised room on the seventh floor of the Sackler Medical School building. The biobank has, however, been used by other researchers to articulate an imagination of a genetic Jewish people, a bio-nation, as for example in the famous 'Cohanim' study by Skorecki *et al.* (1997).

The fact that the biobank primarily receives requests for samples from non-related individuals, and since these requests do not usually specify ethnicity, suggests that the biobank is not usually used for research on the history or origins of the Jewish people. If the Israeli biobank succeeds to foster a sense of moral community, it appears to be a secular humanistic community based on global participation in the advancement of healthcare opportunities for mankind. Moreover, it does not function as a representational space that broadcasts a demographically inaccurate image of the population of the state of Israel.[70] Even while the precise borders of Israel are contested and undefined, the representation of ethnic groups in the NLGIP roughly corresponds to the ethnic makeup of the population under internationally recognized Israeli sovereignty. This is not to say that the biobank is ideologically innocent, or politically neutral, nor can it be understood independent of the territorializing project of Zionism, but rather that it reflects a historical *status quo* and does not seek to challenge it. This raises the question of the value coalesced in the national biobank. How is the biobank's value related to the broader landscape of bioscience research and biomedical development?

The significance of discovering variants that are related to the development of specific diseases cannot be fully explained without recognition of the wider political economic context of molecular medicine and especially the move towards personalized therapies. This fact points attention to two anthropological concerns that were discussed in the lab: the protection of personal human genetic data and the question of the value of genetic data.

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[70] I recognize that the geographical limits of the state of Israel are difficult to determine. For the purposes of this conversation, I am assuming that the population of the state of Israel is the population within the internationally recognized 'green line' and not including Israeli settlements and residents in the occupied Palestinian territories (OPT).

Regimes of Value and Commodification

During my first meeting with Noam, he told me that the Safra Center for Ethics at Tel Aviv University had awarded him a grant to work with a lecturer colleague in computer science, Eran Toch, to study the protection of genetic data. The project was to be conducted by a shared master's student, Netta Rager, who would spend the year writing a dissertation about ways of protecting privacy in genetic research. Since I was already affiliated with the Safra Center for Ethics as a visiting fellow, and since I had already joined Noam's lab as a visiting scientist, he invited me to join the project meetings and offer my perspectives. I told Noam that I would be very interested, and he immediately swiveled in his chair and wrote a short two-sentence email to Eran, suggesting that I join them at their next meeting.

During a project meeting in October 2015 with Eran, Noam, and Netta, I learned about the details of the project and how they were trying to develop a better way of protecting genetic data. The meetings usually began with Netta presenting her work in progress, followed by a group discussion. All the meetings were conducted in Hebrew. They were not, however, strictly interested in protecting privacy outright. Rather, they were primarily interested in coming up with a so-called 'sensitivity score' for specific genes of interest. A sensitivity score would be a way of ranking which genes are most important when it comes to disease risk and rating which genes are not that important. This was considered a necessary and somewhat urgent step in building tools to protect genetic privacy since the speed and efficiency of sequencing are advancing quickly. This need is not unrelated to global market dynamics.

The economic valuation of genetic data is a consequence of advances in technologies that can yield sequence data faster than before. This process is expedited by the dropping cost of sequencing a person's complete genome, which has plummeted from $100 million, in 2001, to $399 in September 2015 (Rager 2015:3). This figure is expected to continue to drop in the coming years. Moreover, the amount of useful information that can be derived from a person's genome is expanding as the interpretive capacities of data analyses develop. The commonly held notion is that with better databases of genetic information and medical history, scientists will be able to identify the genetic causes of disease and intervene accordingly. But as sequencing speeds increase, and as interpretive power grows, the question of how to protect individuals' genetic privacy arises. Researchers are thus investigating ways of protecting individuals' data privacy, and ethicists and anthropologists are discussing how genetics can impact human identities. This ethical issue was central to Netta's project, and I was able to participate in the project as an anthropologist who could contribute critical perspectives on the idea of privacy, and how to conceive of individual and collective concerns.

The project would be conducted like this: There is a website online called 1000 genomes,[71] which makes publicly available the genetic data that come from thousands of individuals. The 1000 Genomes website states that the goal of their project is to "find most genetic variants that have frequencies of at least 1% in the populations studied." It is known that the average exome (a persons 'coding' genes) still contains more than 13,000 single-nucleotide variants. About 2% of these variants are predicted to affect the encoded protein. By identifying the role of variants, the impact on health and disease may be

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[71] 1000 Genomes: A Deep Catalog of Human Genetic Variation, accessed Nov 16 2015, http://www.1000genomes.org/about

better understood (Eisenstein 2015). This goal, it is often argued, can be achieved by sequencing many individuals. Since it is still too expensive to fully sequence all of the samples available, data from many samples are combined to allow better detection of variants in any specific region. This way the project can detect most variants with frequencies as low as 1%.

Despite the name 1000 Genomes, the project actually has about 2,500 samples.[72] The website offers 'VCF files' (variant cell format), which contain the list of single mutations or variants that the individual has. In distinction to other available genomics databases that offer the medical history of the donors, 1000 Genomes does not have information about where donors live, their race, or their medical history. The idea for Netta's project was she would download about 10 or 20 people's VCF files and identify the rare variants. She would identify the genes that contain the variants, and calculate the association of the variants with the reference populations. The reference populations are the racial groups that are designated by the donors. By identifying the genes that contain the rare variants, Netta could then search for medical information about the importance of the specific genes in diseases and longevity. By quantifying the 'sensitivity' of a gene by the amount of its importance in relation to longevity based on the amount of published articles that mention the gene specifically, she would be able to score genes and accord them a specific sensitivity in terms of the medical importance of knowing about it, as well as the ethical sensitivity of the gene in terms of public disclosure. Noam thought this project to be extendable for calculating the cost of treating specific diseases associated with certain genes and ultimately would be able to yield a tool for calculating the likely

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[72] 1000 Genomes, http://www.1000genomes.org/about

‘cost’ of having a specific variant in terms of the expected utility costs of medical treatment. This would be the cost of the risk that the individual would bear as an insured customer, in a similar way to which car insurance is calculated by known variables, like gender, age, race, postcode etc.

This project is part of a turn towards the commercialization of medical and genetic data. For example, an Israeli company called InnVentis states on its website that “biomedical R&D needs a paradigm shift,” since today, “50% of drugs fail in late stage development due to lack of superior efficacy.” Meanwhile, the cost to produce a new drug increases (billions of dollars) and the time to market remains ten years or more, on average. They thus conclude, “the current R&D model is broken” (InnVentis).[73] To solve this problem, they envision in the future new drugs will only be marketed to the right patient, who would respond well to the drug.

InnVentis plans to use mass molecular diagnostics technologies, such as genomics, proteomics, and metabolomics, in combination with big data analytics, which they claim will usher in a new generation of actionable knowledge about disease mechanisms. This new knowledge would improve diagnostics and drug discovery but would also boost the short-term profitability of pharmaceutical companies and the data analytic stakeholders involved. They expect this new ‘paradigm’ to have “disruptive potential well beyond for the biopharmaceutical and health care industry.”[74] The context of Netta’s project is thus a moment when personalized genetic data are about to become a site for wholesale commodification, as disease state, risk, and treatment populations will

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[73] InnVentis, company website, accessed Nov 19 2015, http://www.innventis-pharma.com

[74] InnVentis, company website, accessed Nov 19 2015, http://www.innventis-pharma.com

be made and reconfigured. In this context of precision medicine, we see individual genetic data engulfed by the valuating context of neoliberal economic rationality, with the condensation of reified value in genetic data, and the foregrounding of the individual, the bearer of genetic data, as the rational defender of 'private' property. This move is troubling and encouraging at once, opening a window into the inevitable affective ambivalence inculcated by the neo-liberalization of medical progress. Let us look at the positive side of what this work is achieving. Specifically, the work I observed in Tel Aviv is helping improve the treatment of breast cancer and depression.

Personalized Medicine

Noam Shomron recently gave a talk, titled "Big data and Genomics: Halting the spread of Breast cancer," as part of Nano World Cancer Day 2017, held at Tel Aviv University in February 2017. In his talk, he presented research his lab had conducted on breast cancer tumors, in which the lab succeeded in stopping tumor metastasis using a novel method. He opens the talk by introducing the field of genomics with the problem of data management. We have moved from an era when genomic information was extremely expensive and inaccessible to individual patients or consumers. While in 2001, the cost of sequencing a single person's genome was equivalent to the price of four jumbo jet airplanes, today, however, the cost is about the cost of a bicycle (See Figure 2).

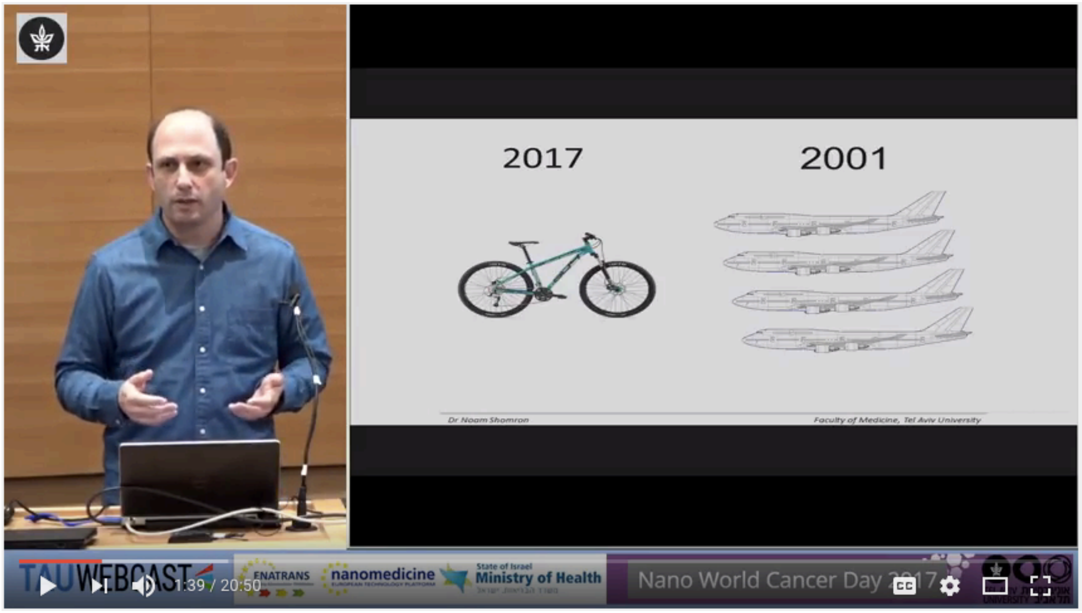

Figure 2. Cost of sequencing a single person's genome. In 2001, the cost was equivalent to the price of four jumbo jet airplanes, while today, it is roughly the cost of a bicycle. This lecture was part of Nano World Cancer Day 2017, held at Tel Aviv University in Feb 2017. Accessed Feb 3 2017, at https://www.youtube.com/watch?v=yGf5JTwvsIQ

The avalanche of data that these developments have yielded allows for precision medical therapeutics, which Noam describes as "comparing the DNA of one individual to another individual and trying to fit a treatment, or a therapy, or trying to fit a particular drug, based on these DNA differences."[75] In the research that Noam presented, the team took genes involved in the development of cancer, and more specifically, the genes that are related to cytoskeleton organization. These are genes that code for proteins that are essential in cell division, a process that is crucial for cancer growth and metastasis. They investigated the 19 genes that could be key targets for stopping tumor metastasis, and in particular, the 'palladin' gene, which, they demonstrated experimentally *in vitro* and *in vivo*, can be targeted to block metastasis. They demonstrated this using gold nanoparticles

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[75] This lecture was part of Nano World Cancer Day 2017, held at Tel Aviv University in Feb 2017. Accessed Feb 3 2017, at https://www.youtube.com/watch?v=yGf5JTwvsIQ

that delivered micro RNA that blocked the palladin gene and therefore stopped the metastasis of cancer cells in the mouse model.

The significance of these results is that in the future, this technique could be used to stop the spread of breast cancer during the removal of the primary tumor. These results also demonstrate the utility of computational genetic screens, which can help identify genes to target for specific purposes. While this cutting-edge work is not related to the specific tailoring of cancer treatment for different patients, the presentation of the results was nonetheless framed in the language of precision medicine. It is arguable that the wider banner of 'precision medicine' serves to broadly signify future-oriented research that promises therapeutic breakthroughs even if the promise does not fit perfectly with the definition of precision medicine that Noam initially offered. Other research I observed in Tel Aviv did, however, deal with the tailoring of therapies by individuals' genetic profiles.

A key way that I integrated into Noam and David's labs was by participating in an on-going project that seeks to identify the molecular basis for resistance to antidepressant therapy. The project has to do with one of the main lines of treatment for depression, selective serotonin reuptake inhibitors (SSRIs), the most commonly prescribed antidepressants. The problem with SSRIs is that they do not work for everybody. SSRIs only work for about 60 percent of people with depression. Further, they provoke a different set of side effects for different people, and it takes SSRIs three to four weeks to begin working.[76] Though it is not currently known why some people respond to SSRIs better than others, SSRIs are thought to work by blocking the reabsorption of the

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[76] 'TAU research finds gene that potentially predicts antidepressant response' Dec 11 2013, accessed Mar 7 2018, at https://english.tau.ac.il/news/gene_antidepressant

neurotransmitter serotonin in the brain, which boosts serotonin signaling and raises mood levels.

David and Noam's labs discovered a gene that they think could reveal how and why some patients may or may not respond well to SSRI treatment. Ultimately, this research could lead to a genetic test that would allow doctors to provide personalized treatment for depression and be better able to decide which course of treatment for each patient. Keren, working with Noam and David, did experiments on cell lines obtained from donors. White blood cells, which are part of the body's immune system against infection, also use serotonin in their signaling even though they are not brain cells. This makes white blood cells a good model for testing the effect of drugs that modulate serotonin signaling.

Keren had analyzed the RNA profiles of the most and least responsive white blood cell lines when treated with SSRI antidepressants. She found a gene called CHL1, which was found at significantly lower levels in the most sensitive cell lines and at higher levels in the least responsive cell lines.[77] She also found a new protein involved in SSRI response called ITGB3. She found that the SSRI drug Paroxetine caused increased production of the gene for ITGB3. Cell biologists think that ITGB3 interacts in some way with CHL1, but the mechanism is not understood well. By figuring out how CHL1 interacts with ITGB3, Keren would better understand how cells respond to SSRIs and could improve their efficacy by modulating the genes for CHL1 and/or ITGB3.

David had suggested that I talk to Keren and try and figure out a way to measure the interaction between CHL1 and ITGB3. It wasn't clear what experiment could answer

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[77] "Tel Aviv University researchers discover gene that may predict human responses to specific antidepressants," Dec 11 2013, https://english.tau.ac.il/news/gene_antidepressant

this question. I read the relevant research articles on the topic in advance, and I scheduled a time to speak with Keren. We sat in high-stools at the lab bench and discussed the project, scribbling potential cell-biology mechanisms and theorizing possible experiments that could test the hypotheses. I thought that the use of a fluorescently-labeled serotonin transporter (SERT) could be used to quantify the response of the cells to SSRI treatment. I suggested that we use the gene for a fluorescent-tagged serotonin transporter to measure the effect of ITGB3 and CHL1 on SSR activity. Keren hadn't used such a technique before but was happy to try the experiment since the tools were available in the lab to do it. I emailed a colleague in Germany (a professor whose class in neurobiology I took at college in Dublin). His lab technician obliged and mailed us a tiny plastic tube with DNA of the fluorescent-labeled serotonin transporter, which we would use in our experiments. It arrived in a padded envelope two weeks later.

This project remains ongoing, as Keren left on maternity leave in April 2016, and I left the lab before her return in August 2016. The core lesson from this vignette is that the research I was involved with centered on genetic markers for disease risk or differential sensitivity to pharmaceutical therapies. The role of racial categories was not an output of the research but rather an *a priori* assumption, which did not feature further in the discourse or outputs of the research. Racial or ethnic categories would only matter in the context of this type of research insofar as reference populations could be a source of unique variants that associate with a particular condition or pharmacological profile.

This work is typical of research in molecular genetics in Noam and David's lab, being unrelated to Jewish or ethnic origins. Such studies, however, point to the importance of biobanks to biomedical research and highlight biobanks' growing importance in the shift towards precision medicine.

Biobanks and Nation-Building

Biobanks have been a growing phenomenon worldwide, especially since the 1990s when genome sequencing began to provide the possibility of representing the genetic data of large numbers of people. With the advent of fast genomic sequencing, there was much excitement about revealing how many diseases may be associated with single-nucleotide polymorphisms, individual genetic mutations. By identifying the molecular basis for many diseases, it was thought that a new age of disease prevention and treatment would arrive. It was widely believed that by performing genome-wide association studies with the masses of data generated from thousands of individuals would identify many clear-cut disease biomarkers. Cambon-Thomsen *et al.* (2003) argue that large biobanks mark a change in the scale of genomics to an industrial-type work organization, with the use of large-scale platforms. Genetics is developing into a wholesale operation with massive scaling up of the amount of data and the rate at which it can be analyzed. But biobanks usually collect data on populations in specific regions and aim to recruit participants who are representative of the general population (Chadwick and Berg 2001). In distinction to family-based genetic disease registers or centralized medical records, biobanks began to catalog participants that are representative of the population as a national cohort (Chadwick and Berg 2001).

‘National biobanks’ sought to collect data from the population of a given region or nation (Kaye 2004). National identity and the entailed imagined communities consequently become refracted through biobanks and the biomedical developments they promise (Busby and Martin 2006). Biobanks, therefore, became a rich site for articulating visions of the nation, moral community, and natural peoplehood. Busby and Martin (2006:238) claim that “[e]ach biobank has markedly different aims, operational arrangements and regulatory regimes,” where varying “ideas of national interest, identity and heritage [are being] constructed and used in the enrolment of support for national biobanks” (2006:241). Moreover, the knowledge that these interpretive projects produce can impact populations’ self-understanding and their ethical and moral relationships to the community (2006:246). This can bolster the idea of being part of a lived ‘imagined community.’ But despite the capacity to instill an imagination of national coherence, biobanking projects may also be divisive and splinter groups that live within the national territory, thereby producing an ethnic or national difference. Hinterberger (2012:528) writes that

> “in one of Canada’s first large-scale biobanks, French Canadians, who are understood as a genetically close or homogenous population, are contrasted with what are referred to as ‘immigrants’ and ‘Que’becers from various ethnic and racial backgrounds’ in public engagement and consultation forums.”

She also writes (2012:542), however, that “some national institutions engage in what might be called genome nationalism.” The Mexican Genome Project, for example, made claims that Mexican genomes belong under national sovereignty, tying national identity and civic participation with the aims of genomic biobanking and medical advancement (Banjamin 2009; Schwartz-Marín and Cruz-Santiago 2016; Schwartz-Marín and Restrepo 2013; Schwartz-Marín and Silva-Zolezzi 2010). Historian of science Shapin (2000:15) therefore writes that DNA is

> “an anti-Modernist molecule: a molecular warrant for all the natural differences the conservative thinker could ever want to identify and insist on – differences between unique individuals, between the sexes, races and nations.”

At the same time, DNA is

> “a Post-Modernist molecule, since fragments of our contemporary expert culture insist that the reflexive condition for believing these things about DNA, or indeed disbelieving them, is ultimately ascribable to the workings of DNA itself, while the knowledge of those workings is an authentic item of our culture.”

DNA thus becomes a site in which we can imagine ourselves while constructing and dismantling imaginations of collectivity that we electively value. DNA biobanks are therefore a good site for investigating the workings of national imaginaries and the limits of belonging. They act as a social mirror, serving as sites for contesting the natural aspects of humanity. They provide an objective substrate for measuring differences between sex, race, and national identities, as they assemble an ensemble of diverse individuals to yield a collective identity with specific characteristics. They supposedly achieve a bridging of individual biological complexity with a national or supra-individual type, and they represent the imagined natural aspects of populations, and the limits of belonging. For this research, the question remains as to what kind of national imaginary, or moral community, is co-produced with the Israeli National Biobank. This proposition demands a more sustained and philosophical consideration of the entanglements of epistemology and politics. Crucially, this raises the question as to whether bioscience can indeed be ‘neutral’ on these issues of national identity. Even if the Israeli biobank does not directly produce a narrative of Jewish identity, origins, or belonging, in what ways does it authenticate or reinforce the existing ethnic identities it mobilizes in its categorization of human difference? I move now to consider a body of scholarship that has grappled at length with philosophical questions of the valuation, context, and politics of science and technology: The Frankfurt School of Critical Theory. The purpose of this discussion is to think more deeply about the normativities, rationalities, and regimes of valuation brought into being by technologies, such as a national biobank.

Science as Ideology

The discourse of science encodes aspirations and normative assumptions of what ought to be. In the world of functional genomics, the pursuit of an improved biomedical future both motivates and sustains ongoing research. The anthropologist of genetics Anna Jabloner (2015:28) aptly writes,

> "The indigenous imagination of genomics…entails a persistent, anticipatory orientation toward the future, a variable, but always taxonomical, politics of human biologies, and an ingrained technological meliorism that subordinates the political under the emerging objective truths of a globally circulating, unmarked techno-science."

In thinking about genetic technologies that impinge on the imagination of ethnicity or nationality, it is not just the promises of the future that are at stake, but also the shared history between citizens, their national identities, and the shared world in the political present. As Abu El-Haj makes plain (2012), genomics furnishes both a science of the predictive medical future while indirectly yielding a mythology of the ethnonational past. The political present, and the possibility of continuity hang on the shared imagination of both a shared past and a secure future. This reading proposes that scientific discourse acts as a vehicle for purposive ideological projects while purporting to be value-free, neutral, and apolitical.

The opening sentence of the preface to Frankfurter Herbert Marcuse's '*One Dimensional Man*' asks us to consider the constitutive relationship between technology and politics in the reproduction of society and its regimes of power. He asks, "Does not the threat of an atomic catastrophe which could wipe out the human race also serve to protect the very forces which perpetuate this danger?" (Marcuse 1991[1964]:xi), necessitating the relationship between the powerful technology of nuclear weaponry to the geopolitical relations that they sustain, and which in turn also necessitate their existence, to be considered in a dynamic relation of mutuality. The implicit proposition is that dialectical thinking is essential to examine the way in which science maintains political orders. And that it is also essential, in turn, to investigate how those political orders necessitate specific forms of technology to maintain their potentially catastrophic hegemony.

The constitutive dialectic between technology and society poses the question of whether technologies are *a priori* political or whether they gain a political dimension by virtue of their application in specific contexts. While Marcuse's formulation is posed as a dialectic, it is not concerned with disavowing the 'identity' of the technology itself. Instead, Marcuse regards the elements of the dialectic in essential terms: technology is political, and politics is technological, but these categories are indeed conceptually distinct and separate as they bleed into one another empirically. They relate to one another in seemingly pure terms. This does not allow for the way in which politics and technology meld into one each other and trouble a neat conceptual separation. He says: "The technological a priori is a political a priori inasmuch as the transformation of nature involves that of man, and inasmuch as the 'man made creations' issue from and re-enter a societal ensemble" (Marcuse 1991[1964]:154).

Marcuse gives a concrete example of the way in which technology may also be seen as politically neutral, or outside of a relationship with its context, with the computer and the cyclotron, a type of particle accelerator: "An electronic computer can serve equally a capitalist or socialist administration; a cyclotron can be an equally efficient tool for a war party or a peace party" (Marcuse 1991[1964]:154). In this reading, technology, 'in itself,' is not political. Technology has neither Marxist nor capitalist inclinations. It has no political *a priori*. In this reading, technologies may enter into a dialectical relationship with their societal environs and become part of a system that maintains the political order. The rationality of technologies as they interdigitate with populations renders them inherently political and purposeful. This leads us to the question as to whether rationality itself is inherently a political project.

In distinction to Marcuse, Horkheimer offers a line of thinking about the ways in which technologies are more deeply, indeed intrinsically, caught up in the political choices that determine means/ends relationships, and consequently how the process of rationality is entailed in the intended uses of technology (or the ends intrinsic to the technology), thus leading to immoral ends. In 'Eclipse of Reason,' a similar line of thinking to Marcuse is present in that science and technology may be used for political ends. But the focus is more on the problem of historical 'progress' (versus regression) than the way in which a technology can be seen as politically neutral 'in itself.' Accordingly, Horkheimer proposes a critique of science as a political response to society's needs:

> “science today, its difference from other intellectual forces and activities, its division into specific fields, its procedures, contents and organization, can be understood only in relation to the society for which it functions” (Horkheimer 2013[1947]:42).

For Horkheimer, science is not principally an epistemic regime. It is not just a discursive arena where truth and falsity are negotiated. Science is also a form of action, that takes its form in technology, which aims to achieve a physical end manifest in a specific field of society. *Science must be read for what it does rather than what it claims to be true*. Further, for Horkheimer, the part must be related to the whole: technology must be seen in the context of the society it serves a physical purpose for, and science cannot, therefore, be uncoupled and delocalized from the fields of its production. In his reading, the utility and utilization of technology are precisely political and utterly purposeful. Reason can be either ‘objective’ or ‘subjective.’

In teasing out the distinction between ‘objective reason’ and ‘subjective reason,’ he describes the polarity between the physical sciences and the humanities. This way, he clarifies the distinction between instrumental (doing) rationality and ethical (thinking) rationality. He writes that “the physical sciences are endowed with so-called objectivity, but emptied of human content” (Horkheimer 2013[1947]:53); and on the other hand “the humanities preserve human content, but only as ideology, at the expense of truth” (Horkheimer 2013[1947]:53). Horkheimer thus posits a firm division between instrumental reason in the sciences and ethics in the humanities. Crucially, the sciences are not engaged in critical reasoning. They have no engagement with ‘objective reason’; they emphasize ends instead of means. Horkheimer accordingly develops the idea of ‘objective reason,’ which he defined as the appropriate mode of reasoning that is correct and in the greater interest, or the common good, at a particular historical moment. In industrial capitalism, however, we see the rise of 'subjective reason' which objective reason is then subordinated – or 'eclipsed' – by the ends that it can achieve. 'Doing' becomes more important than considering the nature and consequences of the action itself. Subjective reason, by distinction, is concerned with the impact of the ends and not merely the means. Subjective reason is, therefore, the 'symptom' or epiphenomenon of industrial capitalism, a sign of the wrong order of things.

For this strand of the Frankfurt school, the influence of subjective reason overcomes consciousness and goes all the way down to the level of human perception. Horkheimer argues: "the patterns of humanity's way of looking at nature finally reflect on and determine the imaging of humans in the human mind and eliminate the last objective goal that might motivate the process" (Horkheimer 2013[1947]:77). This line of thought demands a displacement of epistemology (that is what is claimed true) and a recentering of what is elected the 'right order of things.' Truth becomes subordinated to the whim of the political.

Historian of the Frankfurt School Martin Jay claims (1973[1966]:63) that Horkheimer and his colleagues always insisted, that "truth…was not immutable" but "[t]o deny the absoluteness of truth was not to succumb to relativism, epistemological, ethical, or otherwise." Rather, for the Frankfurt School,

> "The dichotomy of absolutism and relativism was in fact a false one. Each period of time has its own truth, although there is none above time. What is true is whatever fosters social change in the direction of a rational society."

Moreover, Jay points out that in rejecting all claims to absolute truth, critical theory dealt with several of the problems that the sociology of knowledge was wrestling with at the same time. This passage points us towards a consideration of truth as 'purposive rationality,' and away from a notion of truth as a statement of the necessary state of affairs in the world. It points towards thinking about action over epistemics, or what science achieves over what it claims. If truth is mutable, never guaranteed, and can be seen to evolve along with the society that it serves instrumental ends for, then we might say that the Frankfurt School's 'decentering of the epistemic' resonates with Adorno's trenchant argument against the 'identity principle' (that is to say, the equivalence between concepts and the substances they signify). This is an anti-epistemological position, to be sure, a position that does not rest, that does not close the dialectic: It does not reify the signified element of the scientific utterance at the level of ontology. Rather, Horkheimer and Adorno write "[i]ntellect's true concern is a negation of reification." (Horkheimer and Adorno 2002[1947]:vii). *Things are never simply 'in themselves*.' They are always mediated by society, language, and particular historical experiences. They write that the imperative for the human race to survive is equivalent to "the necessity for enlightenment to reflect on itself if humanity is not to be totally betrayed" (Horkheimer and Adorno 2002[1947]:vii). This raises the question as to whether reason can lead to the right order of things, or whether reason itself is always constrained, trapped, and colored by its historical period.

Jürgen Habermas, another key Frankfurt School thinker, holds a similar suspicion for science and technology. Like Marcuse, he sees technology as a means that needs to be critiqued but that nonetheless remains politically malleable. On July 19th 1968, Habermas gave a lecture that he dedicated to Herbert Marcuse on the occasion of his seventieth birthday. In it he summarizes Marcuse's critique of Weber, reiterating Marcuse, saying "the very concept of technical reason is perhaps ideological… not only the application of technology but technology itself is domination (of nature and men)" (Habermas 1970:82). One would wonder whether the relation between technology and domination could be perfectly co-extensive, that is whether technology can be perfectly captured by the apparatus that coordinates it and imbues it with a particular purpose of action. Technology surely does not necessitate certain actions. It needs to be initiated, built, and put into action by humans. Habermas thus clarifies his own position, saying: "Technology is always a historical-social *project*: in it is projected what a society and its ruling interests intend to do with men and things" (1970:82). Here technology is viewed as the "project" of society, both the vehicle and agent of instrumental intentions. Science projects an aspired order of things. Accordingly, Habermas joins Marcuse and critiques Weber's 'rationalization' not just as technical and depoliticized means-ends logic, but also as a process of motive. He says

> "Weber's rationalization is not only a long-term process of the transformation of social structures but simultaneously rationalization in Freud's sense: the true motive, the perpetuation of objectively obsolete domination, is concealed through the invocation of purposive-rational imperatives" (Habermas 1970:85).

Here Habermas engages in a hermeneutics of suspicion of science and technology and claims that the 'true motive,' the 'purposive rationality' that is concealed by the technicity and objectivity of science and technology, is obscured and concealed by its efficiency in achieving closure in means-ends relationships. *Technology's efficacy masks its purpose*.

In a related argument critiquing the mechanization of society and the mystification of the inherently destructive capabilities of science and technology, Horkheimer and Adorno (2002[1947]:29) say

> "machinery mutilates people today, even if it also feeds them. In the form of machines, however, alienated reason is moving toward a society which reconciles thought, in its solidification as an apparatus both material and intellectual, with a liberated living element, and relates it to society itself as its true subject."

They thus argue that instrumentality is 'in itself' a form of domination since by engaging in alienated labor, man has inadvertently surrendered his historical consciousness. Technology, by controlling both people and objects, violates their integrity, suppresses and destroys them, even while it keeps them alive. In this reading, technology cannot be politically neutral, and consequently, using technology to achieve an instrumental end is to take a "valuative stance," as the scholar of the Frankfurt School Feenberg puts it (1996:45). Feenberg also argues that "technology is social in much the same way as law or education or medicine insofar as it is similarly influenced by interests and public processes" (Feenberg 1996:46). This argument has since gained broad empirical support in constructivist sociology of science and technology (Bijker, Hughes, and Pinch 1989), and scholars of science, technology, and society have further consolidated this viewpoint, as I have noted above (Franklin 1995; Latour and Woolgar 1986; Jasanoff 2004; Jasanoff *et al.* 1994; Daston 2000). However, Feenberg (1996:46) claims that Marcuse belongs in this camp, since "[h]e argues that instrumental reason is historically contingent in ways that leave a mark on modern science and technology."

For Habermas, rationality itself is "non-social, neutral, and formal" (Feenberg 1996:50) since it represents the shared interests of humanity, being concerned with figuring out the appropriate means for any necessary ends. For Habermas, technology is merely an enhancement to the instrumental action that rationality logically nominates as the appropriate and natural form of action at a particular moment. Technology solves the problems we rationally and collectively choose to solve. As Feenberg puts it, for Habermas, “[t]echnology is a medium in which instrumental action-coordination replaces communicative understanding through interest-biased designs” (1996:67). In other words, technology is a neutral vehicle for purposive values, which beget valued actions. Interestingly, Habermas’ dichotomy of purposive-action and communicative-action mirrors Horkheimer’s split between subjective and objective reason, in that it divides the concentration between means and ends, morality and empirical efficiency. But, by displacing what Habermas calls communicative understanding – or what Horkheimer might call objective reason – technology can become political since it relates to the productive forces of society. This is a process of production that is not guaranteed, however. Reason and rationality still allow for critical consciousness.

Lukács (1972[1923]) would perhaps intervene here and argue that a true historical consciousness of ‘the total system’ of production, and of the citizens’ objective role in it, would necessarily lead to class warfare and revolutionary readjustment. But thinking about the way in which technology relates to ‘human interest’ and knowledge may help clarify the way in which thinking of technology as purposeful is distinct from Horkheimer and Marcuse.

To examine the relationship between science and human interest, we must consider the epistemological character of modern science first. Claims to truth are inherently also claims to know the right and appropriate order of things in the world. To assert a particularly powerful epistemic form, such as the objectivity of ethnic genetics, is to foreclose any critique as to the epistemological foundation of the truth statements offered, and consequently, to bolster the legitimate right to the purposive rationality that the uttered truth claims have as effects in the world. It is to humiliate the value claims in the context of truth claims. The identities smuggled along with truth claims, in this process, become reified. Foucault said as much when he articulated power and knowledge. We might then begin to think of epistemic claims, such as uttering a scientific fact, not merely as performing an indexical mode of signification towards the existent order of things but as a speech act that constructs certain social relations that depend on the epistemic content rendered, a worlding event, rather. It is, therefore, necessary to consider the special role of 'objectivity' in achieving a privileged space of epistemological authority, *qua* power and governmental authority, in the sciences.

In Western science, the object of study is canonically deemed prior to culture and society, and consequently, the object under scientific focus is alienable, transferable and removable from its context. This "objective viewpoint" of science is a relatively recent and culturally specific historical affordance, however. Daston and Galison (1992) argued using historical methods that objectivity has not always defined science, tracking objectivity as it emerged as a novel professional ideal during the 19th-century. Objectivity thus only recently became the privileged "blind seat of nowhere," a viewpoint that can "filter out the noise that undermines certainty." After the advent of objectivity, scientists began "to aspire to knowledge that bears no trace of the knower—knowledge unmarked by prejudice or skill, fantasy or judgment, wishing or striving" (Daston and Galison 1992:17). Similarly, Habermas (1970:98) claims that

> "Science and technology were not interdependent until late into the 19th century. Until then modern science did not contribute to the acceleration of technical development nor, consequently, to the pressure toward rationalization from below."

This is the same period that gave rise to mechanization and also the epistemic ideal of putatively apolitical objectivity. The ideal of objectivity, which began underlying science, starting in the 19th-century, would become essential to the thermodynamics of the steam train, the ordering of the factory, and also to the practice of modern medicine.

One wonders what the relationship between ontology and objectivity is at an epistemological level. Philosophical ontology, which assumes by the identity principle that the concept is equivalent to the signified substance on the plane of being is a claim about the order of things. But what is it about the epistemic mode of engagement that renders the claim viable? What experience is necessary to arrive at the point of buying into philosophical ontology? Horkheimer (2013[1947]:127) clarifies his position, saying

> "unlike science, ontology, the heart of traditional philosophy, attempts to derive the essences, substances, and forms of things from some universal ideas that reason imagines it finds in itself. But the structure of the universe cannot be derived from any first principles that we discover in our own minds."

For Horkheimer, ontology cannot legitimately originate from one's mind. It must have an empirical and mediated basis, like science. Ontology, and the furniture of the universe are not *a priori* given but emerge in a relationship to the human mind and its available modes of experiencing and knowing. Ontology and the knowledge that renders possible its claims to 'being' are therefore particular cultural products. The mediating role of society is thus crucial in connecting ontology with the epistemic. What exists is dependent on how we can know it. Horkheimer (2013[1947]:128) says that

> “the major argument against ontology is that the principles man discovers in himself by mediation, the emancipating truths that he tries to find, cannot be those of society or of the universe, because neither of these is made in the image of man.”

Scientific facts, like the engineer who focuses only on the ends, do not point explicitly to their instrumental rationality, but they do entail a normative regime of affairs that comes from society and not from the individual’s engagement with objective reason. Horkheimer says that “a concept such as that of fact can itself be understood only as a consequence of the alienation of human consciousness from extra human and human nature, which is in turn a consequence of civilization” (Horkheimer 2013[1947]:120).

This conversation brings us back to reexamine the subject matter at hand, ethnic genetics, which can now be revisited as an important site wherein the national identity secretes itself under what we can now understand as the cloak of a depoliticized objectivity and technical progress.

To complete this brief reading into the Frankfurt School, as it pertains to science, society, and identity, it is fitting to address the issues of ethnic genetics and the molecularization of human identities. What are the politics at play when the nation becomes inscribed in genetic data? How are the relations between humans, and the identities they have historically created been misrecognized as essences ‘in themselves’? Comaroff and Comaroff (2009:45) read ethnicity as both “ontological” and “orientational,” in that it claims a substantial factuality, entailing a volitional commitment to an essential identity as well as participation in a wider ethnos. Similarly, Dominguez (1989:21), in her discussion of ethnic identity in Israel, and specifically Jewish peoplehood, reads peoplehood as a process of “objectification,” by which she explains “the possibility that through dialogue and discourse we may assume, or at least come to believe in, the existence of something whose very existence is, in fact, continually ‘created’ by discursive acts of signification in which we participate.” The discursive creation of the ‘nation thing’ as a scientific object is at issue.

My thesis on the process of the molecularization of ethnic identity at the level of genetics that I observed at the NLGIP is that *the arrival of ethnic genes*[78] *demands a double reification*. Ethnic genetics that bridges human identity and biological code rests on a molecular genetic reductionism. That is, a semiotic ‘code’ read from the sequence of DNA ‘matters’ (i.e. indexes something) in a substantial way in determining the social identity of a person as he stands in relation to imagined co-present national others.

This means that DNA sequences bear a legible trace of a particular ethnic essence when ethnic groups are presupposed in genetic analysis. The relation between the individual and the collective is reified, and this process is rendered a necessary and structuring reading frame for ethnic genetics. These felicity conditions, specifically a national imaginary or racial reference population, are the frame of identification. As Comaroff and Comaroff (1992:51) state in relation to the social ontogeny of ethnic identity: “it is the *marking* of relations—of identities in opposition to one another—that is ‘primordial,’ not the substance of those identities.” A relation between individuals is *a priori* assumed: the nation or ethnos. It is *assumed* in the psychic sense and also in the social, orientational, sense of the word. But the nation is likewise performed as a

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[78] I use ‘ethnic genes’ to denote the diverse practices, measurements, and claims about populations and the natural associations of individuals. I do not wish to fall into the trap of equating the signifier ‘ethnic genes’ with the genetic sequences that are putatively ethnic markers. ‘Ethnic genes’ therefore means both the process of reification of genes and elective human identities and their mutual conflation in the practices of population genetics. ‘Ethnic genetics’ stands for the ontological mediations that render misrecognition possible.

common-sense assumption. As a *historical a priori*, it must be recognized that many of the genetic variants that are used to establish associations between individuals and makeup populations do not matter at all phenotypically. Consequently, a putative, claimed association with others based on non-phenotypic DNA code is a consequence of a situated reading that imputes ‘unmeaningful’ associations: readings that are unmeaningful in the sense that they are far removed from lived and perceptual experience outside of statistical genetic analysis. They themselves cannot be sensibly experienced in normal quotidian life. They escape aesthetic capture.

Moreover, the fetishization, that is, the attribution of animated history, life, and character, of non-coding DNA overlooks the origins of the epistemic practice of genetic reading itself. Instead, genetic reading, as a hermeneutic process, condenses in the genetic substance an *a priori* signature, an identity that bears an essence by virtue of its relation to both other individuals and the reader, who is situated in a specific historical context. These ‘ethnic’ readings thus succeed to group individuals by their shared unmeaningful differences, such as their non-phenotypic variants. The origins of these associations are therefore only ‘objective’ (*qua* disinterested, necessary, but unpurposeful) if we disavow the ontological politics at play, the choices that are made in the process of engineering a reading, and of the wider historical conditions that have rendered the reading conditions – the felicity conditions – meaningful, thinkable, and knowable, in the political present.

To attribute ethnic identities to DNA samples and sequences, even through robust statistical associations, is, therefore, a double reification: it also misrecognizes the non-phenotypic (non-indexical) genetic sequences as meaningful by virtue of the codes’ contiguous relationship with other coding genes that humans carry with them. Signs of nothing become signs of something unique due to their similar clustering. The relationship between coding and non-coding becomes a constitutive dialectic of repetition of insignificance, yielding difference, even if such non-coding sequences may have a biological, or epigenetic role later to be determined in an imagined future.

This ‘reading dialectic’ is also a reification of the political imaginaries of the present that render meaningful the categories of ethnicity that can be used to sort individuals into historically associated groups, and which can be subsumed within an identity category. To arrive at a closed identity, as Adorno (1980[1966]) argues, is to willfully misrecognize concept as substance. It is to conflate ontology with its particular and historically constituted modes of mediation. Rather, it is only ontological claims that should be accorded ontological status and critiqued accordingly.

To continue to critique the process of the molecularization of identity, then, it is the claims and assumptions themselves that must be historicized and displaced. As to where this reading of ethnic genetics fits with the wider school of critical theory, it should be clear that I am emphasizing the critique of ontological claims through an approach that ‘reads around the problem,’ that describes the context that produces the contours of the problem, and that valuates the utility of the epistemic claims. In this chapter, I have looked at citizenship law, political thought, global science, demography, and trends in global biomedicine to answer this question. This line of thinking is in keeping with a critical social science that can deliver a better understanding of problems facing society, without taking an internal advocacy position *per se*. The output of such a critical theory of science should, ideally, better inform publics to make democratic decisions based on new knowledge rather than depart from a pointed and partisan critique. I am gesturing towards a generous anthropology of science that highlights the possibility of the otherwise, while also attempting to understand the complex overdetermination that has configured the present as such.

Ethnic genetics can vary from being a purposeful application of a technical tool in the service of building an image of peoplehood, but it can also be put to use in the service of common humanity even while these two projects may overlap and interdigitate in complex ways. The question of the politics of a scientific practice depends on the relation between the public discourses that emerge as a consequence of the scientific output, while the context can to varying degrees impact the way in which populations are imagined and managed. To conclude my study of the Israeli biobank, a note on the imagined future that current genetics research is oriented towards.

A National Resource?

A slow Sunday morning at the lab bench. I glanced up from my laptop towards the long bookshelf above my head stacked with popular science books, such as a biography of Craig Venter (whose private company supplanted the US National Institutes of Health's effort to become the first company to sequence the human genome), a book by the popular philosopher Richard Dawkins, and several chemistry, biology, and genetics textbooks. A small lab library, stocked with books both informative and inspirational. I noticed one book with Noam's name on the spine. Curious, I took it down to examine it. The book, a volume Noam (2013:v) had edited, was titled "Deep Sequencing and Data Analysis." In the preface that Noam had written, he opens with a quote from Irish writer Sean O'Faolain, who writes: "there is only one admirable form of the imagination: the imagination that is so intense that it creates a new reality, that it makes things happen."

The power of imagination is not lost on leaders in genetic medicine. Rather, the place of creative imagination at the beginning of this book suggests that imagination indeed comes first, and only then can worlds be changed. This native insight resonates with the analytic idiom of "sociotechnical imaginaries" (Jasanoff and Kim 2015) and indeed demonstrates that theory is not only useful interpretively from an etic position, but rather, may be precisely the way in which scientists consciously aspire to motivate colleagues and drive their knowledge communities forward.

In the era of speculative biocapital, it is easy to be cynical or skeptical about the promises of science and to dwell on the injustices of healthcare access. Do the promises live up to the resources invested in the biosciences? Is our ability to define our health being alienated from our hands? Will we end up over-prescribed and over treated as medicine becomes progressively commercialized? These are important critiques that ought not to be extinguished by the louder voices of technoscientific promise. But we must be proportionate and temper our ambivalence. Despite persistent inequalities in health care treatment, access, and outcomes across the globe and indeed within the cities of the so-called 'developed world,' the developments over the past century in our understanding of the basic biological mechanisms that underlie wellness and disease have steadily enhanced human health and longevity. While these benefits have not been delivered equally to all, the technical opportunities that are possible have unequivocally advanced. At this historical moment, the convergence of engineering, computer science, and the biological sciences have created a further opportunity for a transformation in the way health care decisions can be made.

Biobanking and big data analysis have become key to bringing about both this important material advancement as well as its entailed imaginations about utopian societies and the malleability and controllability of bodies and their futures. But biobanks must not just be understood as technical arrangements nor simply as material assemblages. They acquire their meaning and achieve the imagination of value, utility, and meaning in specific local contexts, and as part of global regimes in power and knowledge.

To put it concisely, in Israel I have found that the NLGIP is not a nationalistic project. It does not strive to emphasize biological relatedness between Jews or their connection to a territory. It is not an ethnonational biobank; it is a nationally located biobank with extra-national ambitions and activities. The explicit motivations and goals of the biobank were initially to be part of a global trend in cataloging the diversity of human populations in as inclusive a way as possible. The moral core of the Israeli biobanking project is, therefore, a humanistic one, resting on an imagination of universal human betterment through biomedical development and research. Once samples are sent to other labs for experiments, the NLGIP has no control over the results or of the way in which they are used for ideological purposes. The biobank itself has no goal to establish or displace identities. Accordingly, Prainsack's (2007:86) study of Israeli biobanks has similarly found that, rather than creating novel identities, "biobank projects are more likely to obtain public support and trust if the concepts and terminologies that materialize in biobank practices correspond with established narratives in a particular society."

Similarly, Siegal (2015:767) recently found that "a striking absence of antagonism between the goals of science and the public good characterizes Israeli discourse." In line with these viewpoints, I too found that the NLGIP reflects established Israeli concepts and ethnic identities rather than challenging them.

The potentialities that the biobank affords are, however, not inseparable from the outcomes that emerge, and the custodians of the NLGIP cannot possibly control the unknown outcomes of the research that will emerge. The means-ends relationship of the technology of the biobank is not guaranteed, and while the biobank offers a means to further the universal humanistic project of biomedical advancement, it cannot rule out the possibility of eugenic or nationalistic science. And if a right-wing Israeli government develops a genetic database of its citizens, the biobank will unlikely be able to intervene to prevent it. This is to say that the science of populations that the biobank has rendered possible could be abused, and its initial intentions could be undermined. However, as the biobank is now becoming relatively underused, and as the research moves towards computational analysis, it may become more of a biological archive.

The use value that is congealed in the current collection of tissue samples may become eroded and depleted as interest wanes and the biomedical community sets its sights on decoding the medical implications of genetic variants. As time passes, it may become more important for understanding the genetics of the first generations of Israelis, whose genetic signatures are available for reading in the future.

The most inspiring visions that abound in the contemporary field of medical genetics exist in relation to the growing discourse around personalized medicine, and the development of targeted genetic treatments for diseases. Technical progress and the global market logics that drive it forward are far more dominant in the imaginations, aspirations, and values of the labs I observed than anything that can be considered a Zionist science, colored by a sense of biological Jewishness. The Israeli biobank, like an empty Holy of Holies, coordinates and facilitates a mythical discourse of genetic peoplehood, but a look inside reveals the psychic and performative character of genetic citizenship. The science itself falls far short.

Biobanking and “Qatarization”

“Qatar is famous for its shifting sand dunes. Entire mountains of sand can appear on once-flat ground. The direction of the prevailing wind, the *sebkha*, that produces these shifts, however, has not changed. On satellite images Qatar’s desolate land appears etched or scarred by great diagonal lines that run north-west to south-east with the winds. Similarly, the extraordinary growth and modernization of Qatar has seemingly created a mountain of wealth.” (Fromherz 2012:155)

“Qatarization remains Sidra’s ultimate goal in capacity building, the establishment of a vibrant international community is a tremendous opportunity for Qatar.” (Sidra Five-Year Strategic Plan, p.6).

In this chapter I examine biomedical developments in Qatar, specifically the national biobank and the national genome project, asking what kinds of collective identity and moral community are imagined and fostered through these projects. I find that the particular tribal history of Qatar is giving way to a new national identity, and this is explicitly mediated by national biobanking projects and with national plans for improving citizen health through personalized medical therapies, obstetrics, and treatment for both inheritable diseases, and 'lifestyle diseases,' such as obesity and diabetes. I find that Qatar's planned biomedical development is contributing both to the material infrastructural development (capacity building) of Qatar as a player in the global biotech and biomedical research arena while simultaneously mediating a vision of collective 'national' development and biological improvement of the population. This imagined future entails a sense of biological meliorism and presupposes a shared history and biological substance. I demonstrate that biomedical development in Qatar is a key site for reading the particular nature of citizen-state relations, the emergent Qatari national identity, and the metaphysical and infrastructural nation-building projects of Qatar.

Genetic Meliorism

The poster for the December 2015 Functional Genomics Symposium[79] aptly captures both Qatar's labor dynamics and Qatar's ambition in the biosciences (Figure 3).

Figure 3. Sidra Functional Genomics Symposium, December 2015. The symposium "will offer the opportunity to discuss cutting edge advances in functional genomics and in genomics medicine among world-leading researchers and scientists. The two-day event will feature presentations and discussions that will address the impact of genetic studies on complex disorders and rare diseases. An exhibition from world-leading technology and service providers will run in parallel with the symposium presentations." Reproduced, with permission, from Sidra. Accessed Nov 28 2015, at http://events.sidra.org/event/functional-genomics-symposium/

It depicts a white male doctor, stethoscope over his neck, reaching upwards towards a double helix of DNA, almost grabbing it in his hand. The DNA structure is represented by atomic balls, which is not an unusual representation in chemistry. But in this case, the

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[79] The Functional Genomics Symposium's aim was to discuss cutting-edge advances in functional genomics and genomic medicine and address the impact of genetic studies on complex disorders and rare diseases, and communicate new knowledge of functional mapping of the human genome as it relates to 'precision medicine.' Technology and service providers made presentations in parallel with the symposium presentations. The symposium was organized as part of the 'Sidra Symposium Series' and was aimed at academics, researchers, physicians, healthcare providers and regulatory agents working in the field of genomics and genomic medicine.

atoms have a distinctly shiny, pearl-like, appearance – probably a reference to Qatar's past industry of pearling. The double helix is mostly composed of grey pearls, but there are several black pearls scattered throughout the structure. It appears the clinician is reaching to selectively remove a group of three black pearls that are part of the structure. It is as though the doctor is reaching upwards to remove the pernicious and incongruous black balls and restore the monochromatic purity of the DNA double helix.

The symbolism of the advert speaks to the transnational dynamics of research and meliorism that underpin genomic research in Qatar. The Qatari population has many inheritable diseases, which are attributable to a history of tribal endogamy (with an estimated consanguinity rate of ~54%).[80] Recently, scientific developments have seen many European and American scientists and clinicians come to Doha to help improve health outcomes for the population by participating in projects like the Qatar Genome Project, Qatar National Biobank, and Sidra Medical Center. Such projects are exemplary of Qatar's purposeful shift from extracting natural resources, namely oil and gas, to a so-called 'knowledge economy.'

From Pearls to Oil

Qatar has changed a lot over a very short period of time. In just a few decades it has changed from an economically devastated and sparsely populated desert territory to the world's second richest nation (by GDP per capita).[81] Before WWII, Qatar depended on pearling as its main industry, but after a crash in pearl prices in the early 20th-century,

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[80] Sidra 5-Year strategic plan, p.47, accessed online Nov 20 2015, at http://www.sidra.org/wp-content/uploads/2014/12/sidras-five-year-strategic.pdf

[81] CIA World Factbook, accessed Feb 27 2018, https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html#qa

Qatar suffered from not having a diversity of exports, and the population endured the so-called ‘years of hunger’ (Fromherz 2012). In 1940, the entire population of Qatar stood at just 16,000 (Fromherz 2012:1), when Qatari citizens had to tolerate extreme temperatures of the desert with little respite. Today they live in air-conditioned and comfortably furnished modern housing. Qatar is now the world’s largest exporter of liquefied natural gas, and today Qataris enjoy living in a more stable economy than other oil-dependent ‘rentier states’ due to the relative stability of gas prices, in distinction to the volatile crude oil market. Qataris can also spend their time at five-star hotels, malls, and even international universities.

While in the 1950s most oil workers were Qatari (Fromherz 2012:10), most are now foreign, and it is unthinkable for a Qatari to be engaged in manual labor. This change in lifestyle and work role in society has come with a rise in obesity and diabetes. Faced with an endless supply of high-calorie food, the prior risk of malnutrition and exhaustion has been replaced with a risk of such so-called ‘lifestyle diseases.’ These factors put pressure on the state to invest in medical research and healthcare to make the population healthy and to project an image of a healthy society. In Qatar, citizen health and national politics are entangled.

The image of Qatar to the foreign visitor might be that there is no democratic politics in Qatar. And it is true that in Qatar state power is centered in the person of the Emir, and the country’s income is centered on natural gas exports. One wonders, then, what is the national identity or sense of shared community of this relatively new state? If the citizens are not directly involved or represented in the processes of governance, how is a sense of nationhood or citizenship felt, mediated, or performed? First, it must be recognized that genealogy is extremely important in Qatar, where membership in an influential family is a channel to positions of power and influence in the state bureaucracies. In comparing Qatar society and its modes of identification to the USA, Fromherz (2012:5) writes:

> "One of the first questions that most new acquaintances ask in the USA is what do you do, where do you work? This appears to Americans as the most reliable way of knowing somebody. In many cultures, however, what you are, that is what you are in terms of inherited relations with others, is more important than what you do. Indeed, the extended names of Qataris, 'Muhammad bin Khalifa bin Ahmad bin…', for instance, reflect a long string of ancestors rather than the merely one in the case of Western names."

Genealogy consequently matters tremendously in Qatar in determining where one fits into a specific family-centered, indeed tribal, history of the country. While the idiom of the 'tribe' has become associated with a patronizing colonial anthropology that connotes tribal societies as relatively 'primitive,' the "'tribal' lineage is a crucial and internally recognized social form in Qatar." Rather, "ignoring tribes is itself a form of politically correct, neo-orientalism: it means ignoring the major self-identified groupings of Qatar's society, whether imagined or not" (Fromherz 2012:7). Indeed, each tribe also is spatially located and reasonably identifiable. In each tribal village in the city, regardless of size,

> "there is a mosque, and a *majlis*. *Majlis* is a term meaning both council and the place a council meets: local meeting-room where qualified men of the tribe decide on internal matters and the relationship between the tribe and others" (Fromherz 2012:21).

It was not uncommon, until recently, for face-to-face contact between the Sheikh and the ruled (Fromherz 2012:113), and even with the advent of motor cars, highways, and air-conditioned Western living standards, old alliances and family 'bloodlines' have not eroded. Rather, Qatar enjoys what Fromherz calls 'neo-traditionalism,' a blending of tribal traditions with a modern lifestyle, technology, and urbanization. Even if the traditional camels and mud huts have been left behind and replaced with luxurious cars and concrete housing, tribal identity remains crucial to one's place in Qatari society. Rather than an overwhelming national identity being the dominant social identity in the Gulf, tribal lineage is far more prominent in family affairs.

It should be noted that it is not the first time in Qatar's history that the people have depended on natural resources – currently, oil and gas – or extractive industry. For hundreds of years, pearling was Qatar's lifeline. Pearling involved almost the whole population, including the Bedouin who used to help guard pearling villages when the divers were away fishing between June and October (Fromherz 2012:114). There are, of course, differences between pearling and extracting rent from natural oil and gas resources. Pearling was a brutally tiring job, and prolonged exposure to the Gulf salt water, coupled with constant heat above 40 degrees centigrade and a long day's diving, could lead to exhaustion and death. Moreover, the divers typically ate only "handfuls of rice and dates" for dinner in order to avoid nausea during the day (Fromherz 2012:117). The rapid growth of Qatar and change of lifestyle, however, have created some health problems. The rapid onset of a 'modern' way of life, and all of the leisure time and abundance it entails, has yet to be fully absorbed into the older tribal structures and imaginations of a moral community.

Political Precarity, or Diplomatic Advantage?

Qatar's political geography is precarious, sitting between Saudi Arabia to the West, and Iran to the East. Indeed, the 2017 'Qatar crisis' (a diplomatic and economic blockade) sits at the center of a complex web of geopolitical relations involving the US, Saudi Arabia, Russia, Turkey, the other Gulf states, and their respective positions in the war against Islamic State. The protagonist in this dispute is Saudi Arabia, who accused Qatar of supporting terror, and regards Qatar being too aligned with Iran, with whom Qatar shares the Gulf's natural gas fields. It is thus Qatar's relative economic independence from the other GCC states – due to its gas wealth – and arguably also its diplomatic ambition in the Middle East region that have led to its isolation from the other Gulf states.

In this regard, Qatar is in a politically precarious locale. Qatar's independence, however, can be attributed to its deft use of negotiation and diplomacy. It has successfully used its position for diplomatic advantage and to put itself at the center of many geopolitical disputes. After WWI, for example, the Qataris appealed to American oil contractors to compete against the British, thereby securing greater concessions from Britain (Fromherz 2012:65). Qatar has thus capitalized on its position of influence, wedged between the regional superpowers of Saudi Arabia and Iran.

In the past, Qatar hosted the Doha debates, a platform for international discussion about controversial concerns in world economic and international affairs. Qatar also often functions as a mediator in negotiations between Western states and the Arab states, as well as between Arab states. Qatar mediated between the US and Libya in 2003 to lead to the dismantling of Libya's nuclear program. Qatar allowed the US to establish a military presence there in advance of the 2003 invasion of Iraq. Qatar is also often hosting delegations from the Palestinian factions Hamas and Fatah, and Qatar has facilitated negotiations between Morocco and Algeria (Fromherz 2012:90).

Qatar’s current Emir is Tamim bin Hamad Al Thani (born 1980), who became Emir of Qatar in June 2013 after his father's (Sheikh Hamad bin Khalifa) abdication. The Emir, Tamim, was educated in Britain and attended the Royal Military Academy at Sandhurst. The father, Sheikh Hamad bin Khalifa, of the Al Thani dynasty, took power from his father Khalifa bin Hamad in a bloodless palace coup in 1995. It is reported that the deposed Sheikh had “lost most of the energy of his youth and, according to some reports, had descended into alcoholism” (Fromherz 2012:85). After seizing power, Sheikh Hamad had made it clear that he had a vision for the future and development of Qatar. He immediately sponsored and hosted the news network Al-Jazeera; he started a slow process of democratization and reform of the electoral system (he created Doha’s municipal council in 1999) (Fromherz 2012:83); and his wife (the second of three) Sheikha Mozah has since led in cultural reform, establishing Education City (home to several US University campuses), and large-scale biomedical development projects. Despite these steps towards modernization, democratization, and globalization, it should be noted that in Qatar, there is no meaningful distinction between the Emir’s person and the political and legal organization of the state.

After his father handed over power to him in 2013, the Emir became the sovereign power, incarnate, and he is free to pursue his family’s interests and commercial desires with the resources of the state at his discretion. Moreover, the Emir can grant citizenship to whomever he chooses, and he can also take it away without any oversight or process. There are, however, in theory, some limits on the Emir’s power. In 2003, the state established an Advisory Council (after 96% approval in a popular referendum), over which the Emir has the power of veto that can be overruled by two-thirds of the council.

However, the Emir appoints one-third of the council members. In cases of the Emir being overruled, he can also suspend legislation and delay decisions he disapproves of (Fromherz 2012:126).

Tribe or Nation?

Qatar is controlled by a single family, the Al Thani family. The Al Thani dynasty was established later than that of the UAE, Bahrain, or Kuwait, but the Al Thani family did control Qatar before the discovery of oil and had established control of Qatar by the end of the 19th-century. The Al Thani family also controlled the area around Doha at this point (Fromherz 2012:17). Following WWI, and the fall of the Ottoman Empire, Qatar was designated a British protectorate. In 1968, Qatar attempted to form a federation of Arab Emirates in the Gulf, but after Qatar's proposal of Doha as the capital was rejected Qatar reversed its interest in membership in being part of such a federation.

In 1971 Qatar became an independent state. By facilitating the Al Thani's central position of power in the state, Britain also helped to establish in Qatar a monarchical type dynasty, of which there was probably no tradition in Qatar before a treaty between Muhammed bin Thani, and the British Colonel Pelly, in 1868 (Fromherz 2012:53). Before the British deal, political authority was defined by family property or religious grounds, which is determined via Islamic principles and local traditions (Fromherz 2012:57).

Despite the tribal-family nature of the state, a national identity is nonetheless now emerging. The establishment of a national identity involves manufacturing an imagination of a shared historical experience. One particular historical event has been grasped as a moment of collective identity formation, a past battle against a foreign force that brought Qataris together. In 1892, 200 Ottoman soldiers had arrived in Qatar to stake a claim to the territory, and after a refusal by Sheikh Jassim to meet with the Ottomans, these soldiers captured 13 Qatari chiefs. Sheikh Jassim responded, and succeeded to unify and lead a group of Qataris to battle and defeat the Turks at the site of Wajbah. It is this battle that is now annually commemorated as ‘National Day,’ which was only first celebrated officially in 2007. National Day is commemorated annually with parades, military displays, and cultural events, and preparations for the 2017 National day included an Arabic language festival (See Figure 4).

Katara

NATIONAL DAY

CELEBRATIONS

Katara

ARABIC LANGUAGE
FESTIVAL - **Dād**

PG. 02

كتارا
katara

DECEMBER 2016
From Katara and Qatar

Figure 4. Qatar National Day Celebrations 2016. Qatar National Day Celebrations (Dec 2016) were planned for the Katara traditional village. The poster features a parade, soldiers on camels, a falcon in the sky, a traditional pearling dhow (boat), and architecture form Katara.

However, the Emir canceled the 2017 National Day celebrations days before the festivities were set to begin in solidarity with the people of Aleppo, who had been killed or suffered during the ongoing Syrian civil war. National Day, Fromherz (2012:61) writes, "has somewhat surpassed Independence Day, in the size and importance of the celebrations, despite beginning only in 2007." It appears as though the emerging 'National Day' is displacing Independence Day, with the effect of emphasizing national collectivity over tribal particularity. What, then, is the nature of this emerging Qatari national identity, and how is it mediated to inculcate a sense of shared peoplehood?

A Nation Imagined

To answer these questions, the context of Qatari citizenship must first be explored. In Qatar, the relation between state and citizen is not like it is in Western liberal states. In Qatar, the citizens do not fund the state with taxes. Rather, the state supports the citizens financially, in return for their consent in conferring the power of governance to the Emir. But Qatar's demography is heavily composed of non-Qataris (See Figure 1). Qatar's population is 2.2 million (July 2015 estimate)[82], but the ethnic breakdown of groups is Arab 40%, Indian 18%, Pakistani 18%, Iranian 10%, and Other 14%.[83] In Qatar, males greatly outnumber females at a ratio of 3.39 male(s)/female, though this ration varies by age (Figure 5).[84]

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[82] CIA World Factbook, accessed Nov 22 2015, at https://www.cia.gov/library/publications/the-world-factbook/geos/qa.html

[83] CIA World Factbook, accessed Nov 22 2015, at https://www.cia.gov/library/publications/the-world-factbook/geos/qa.html

[84] Ibid.

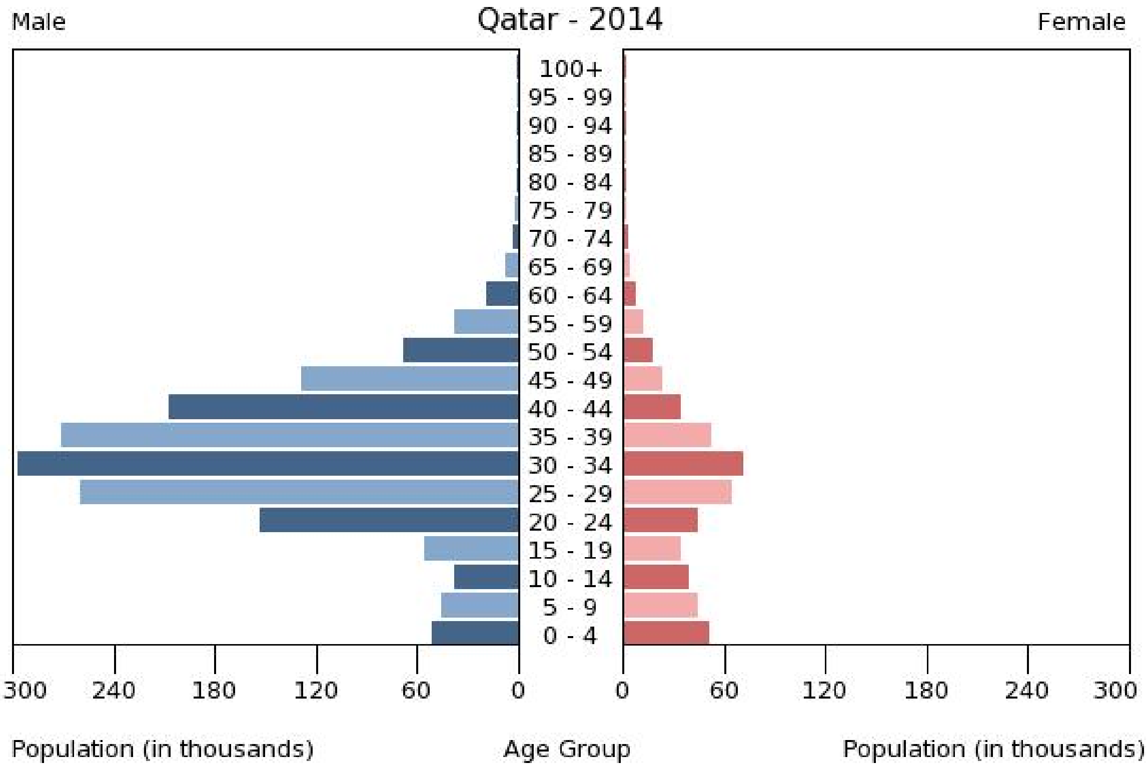

Figure 5. Qatar Population Pyramid. A population pyramid illustrates the age and sex structure of a country's population and may provide insights about political and social stability, as well as economic development. The population is distributed along the horizontal axis, with males shown on the left and females on the right. The male and female populations are broken down into 5-year age groups represented as horizontal bars along the vertical axis, with the youngest age groups at the bottom and the oldest at the top. The shape of the population pyramid gradually evolves over time based on fertility, mortality, and international migration trends. Taken from the CIA World Factbook, Nov 22 2015, online at https://www.cia.gov/library/publications/the-world-factbook/geos/qa.html

Rapid growth in the second half of the 20th-century has seen workers flock to Qatar to help build the country, and today, Qataris are officially estimated to compose 12% of the population.[85] Unsubstantiated rumors that were relayed to me by scientists during my visit in December 2016 suggest that the Qatari population is actually now only

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[85] Population of Qatar by nationality, accessed Nov 22 2015, at http://www.bq-magazine.com/economy/2013/12/population-qatar
CIA World Factbook, accesses Feb 28 2018, https://www.cia.gov/library/publications/the-world-factbook/geos/qa.html

7% of the population. This minority status necessarily raises the question of how a sense of national identity can be produced, maintained, or publicly performed in a country in which the citizens are vastly outnumbered. Fromherz (2012:29) writes that, while the Al Thani family uses historical myths and heritage to maintain their rule, "tribal affiliation and solidarity is slowly being replaced by national solidarity." Qatar is therefore in the process of transforming from a tribal, segmentary state towards a unitary state with power centralized. The Al Thani family has not used force to maintain their position but have used the idea of pre-oil Qatari independence to inculcate a sense of solidarity and loyalty to the state (Fromherz 2012:157). By glossing over history, they attempt to turn "tribal affiliation into a sanitized form of 'heritage'" and maintain power over the state (Fromherz 2012:160).

During the National Day festivities in Doha in December 2017 (some of the planned festivities continued despite the official cancellation of celebrations), I observed at the Darb Al Saai plaza, a host of activities that hinged around national identity, health improvement, and Qatari heritage. This included: a kiosk promoting organ donation; lectures for children about healthy diet; blood donation stations; military displays; camel riding; informative posters about agricultural science, such as date cultivation; shooting ranges and horse riding for children; and an audio-visual cartoon presentation for children aimed at improving Qatari's Arabic language skills. Qatar Biomedical Research Institute also had a stand at which children were taught how to examine a sample of their own cheek tissue cells under a microscope. The confluence of this diverse set of medical, scientific, cultural, and linguistic outreach projects speaks to the multifarious channels through which citizenship is fostered in Qatar.

I observed several other instantiations of the ‘heritage industry’ in Qatar. Most notably, the Msheireb Properties development, which is a subsidiary of Qatar Foundation. Msheireb Properties is an urban development project in downtown Doha, in the Msheireb area, which is the oldest part of Doha. The new development also features a museum complex, consisting of four ‘historic heritage houses.’ The museum brochure states

> “they reveal unique aspects of Qatar’s cultural and social development and inspire to create trusted environments in which the people of Qatar will engage, converse and exchange thoughts about their past and their future.”

The four heritage houses are Bin Jelmood House, Company House, Mohammed Bin Jassim House and Radwani House. Sheikh Mohammed Bin Jassim Al Thani, the son of the founder of modern Qatar, originally built Mohammed Bin Jassim House. The house has original rooms furnished as Bin Jassim inhabited them, so as to preserve a memory and understanding of the heritage of Qatar.

Radwani House is quite similar in that it presents traditional Qatari family life, and documents the transitions that have led to contemporary Qatar. It features artifacts from domestic family life, describes how the coming of electricity impacted social life, and displays images and accounts of the Msheireb region in the early 20th-century.

Company House was once the headquarters of Qatar’s first oil company, and this museum tells the story of Qatar’s petroleum industry through the lives of the workers and families that labored to provide the foundations for the modern nation. The displays include statues of laborers holding tools and engaging in hard physical labor, as well as an audiovisual theatre that plays a short documentary on workers’ lives during the early oil years.

Bin Jelmood House is essentially a slavery museum. Its ambitious aim, the brochure states, is to "raise awareness and play a pivotal role in the global abolition of human exploitation." The museum is a series of chambers, each with their own audio-visual presentation. The first room presents slavery as a practice that in the past was widespread across the globe, and it relativizes European serfdom with other forms of enslavement around the world. The exhibits follow a chronological order, progressing from the East African villages where slaves usually originated, through the passage to Zanzibar, and through Muscat, to Doha, where slaves' daily lives and integration into Qatari life are presented. The series ends with a number of displays recognizing contemporary cases of human exploitation, such as child laborers, sex trafficking, or indeed the abuse of the Kafalah contract (a system of sponsoring migrant labor based on Islamic law) common in the Gulf region. The brochure puts a positive spin on Qatar's history of slavery, stating "[t]he story in Qatar begins in enslavement but ends in shared freedom and shared prosperity."

Another way in which heritage is being deployed as part of the nation-building project is through a project between UCL Qatar and the Qatar National Library, which aims to create a digitized archive of Qatar's early aerial images. There are more than 15 million photographs available, mostly originating from RAF reconnaissance missions in the region.[86] The project is described by Qatar Foundation in their monthly magazine as an important national heritage resource and presented as a project that will not only provide a visual archive on Qatar as a territory but that it will 'map the roots' of the nation (Figure 6). The same issue also features an article about promoting equality

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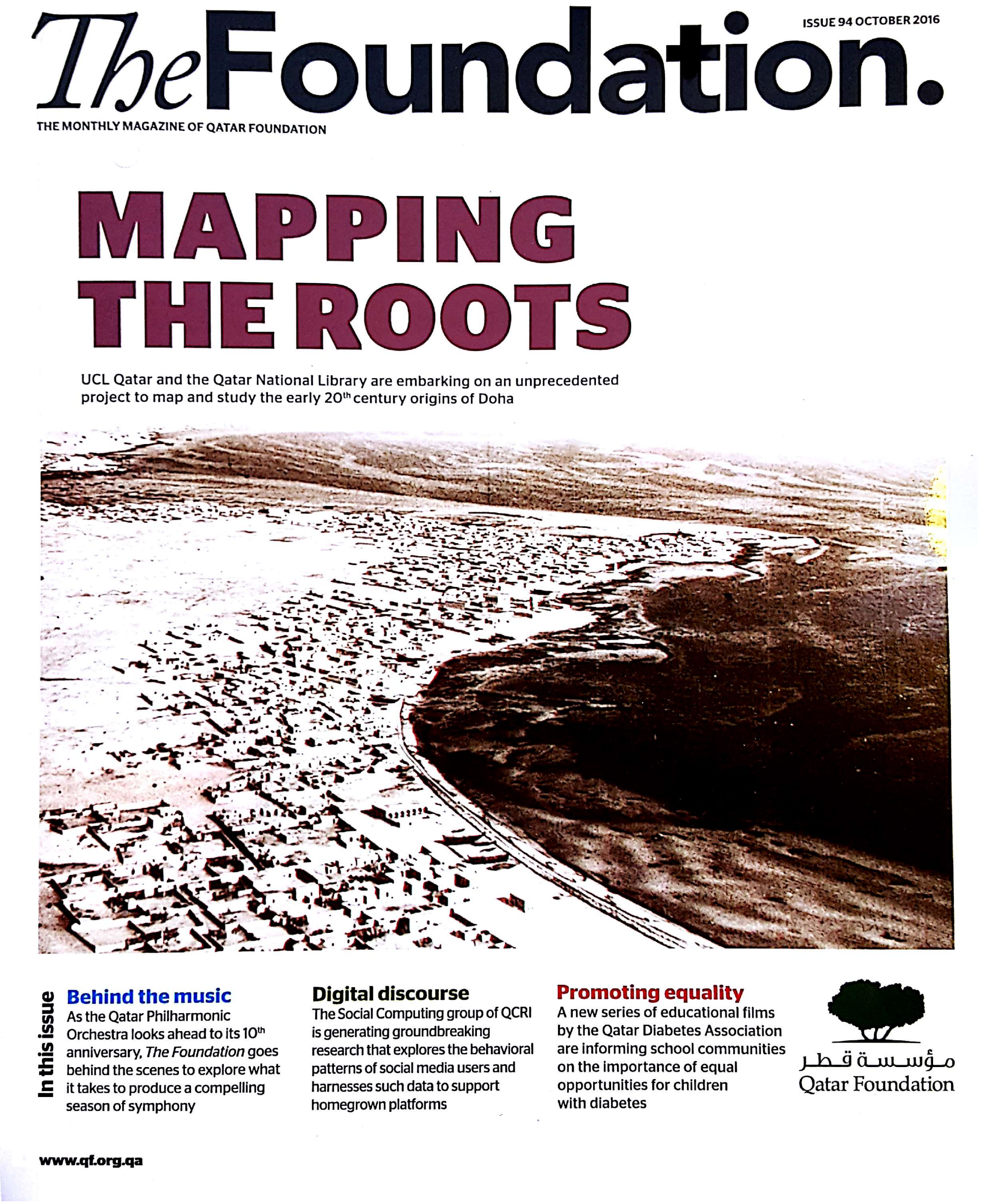
[86] Mapping the Roots of Qatar, in *The Foundation: The Monthly Magazine of Qatar Foundation*, Issue 94, Oct 2016.

amongst children with diabetes, affirming the argument of this chapter that medicine and healthcare are sites for promoting national solidarity.



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The **Foundation.**

THE MONTHLY MAGAZINE OF QATAR FOUNDATION

MAPPING THE ROOTS

UCL Qatar and the Qatar National Library are embarking on an unprecedented project to map and study the early 20th century origins of Doha

In this issue

Behind the music
As the Qatar Philharmonic Orchestra looks ahead to its 10th anniversary, *The Foundation* goes behind the scenes to explore what it takes to produce a compelling season of symphony

Digital discourse
The Social Computing group of QCRI is generating groundbreaking research that explores the behavioral patterns of social media users and harnesses such data to support homegrown platforms

Promoting equality
A new series of educational films by the Qatar Diabetes Association are informing school communities on the importance of equal opportunities for children with diabetes

مؤسسة قطر
Qatar Foundation

www.qf.org.qa

Figure 6. Mapping the Roots. Cover of *The Foundation: The Monthly Magazine of Qatar Foundation*, Issue 94, Oct 2016.

This chapter thus attends to the ways in which this emergent Qatari national imaginary gains an evidentiary footing in biomedical developments and capacity building in the sciences. This chapter asks similar questions to those asked of the National Laboratory for the Genetics of Israeli Populations: What kind of moral community do Qatar's biomedical development and biobank constitute? What ways are ideas of natural peoplehood articulated or refracted through these institutions? What kinds of ethnic distinctions are made, or unmade, through the establishment and practices of the national biobank? Is the biobank a multi-ethnic, pan-Arab, or nationalist project, or does it rest on imaginations of a distributed global community, a common humanity? And, in distinction to Qatar's internal politics, what are the global factors that overdetermine the aspirations and epistemological foundations of the Qatari biobank?

Sidra Medical and Research Center

Sidra Medical and Research Center is a member of the 'Qatar Foundation for Education, Science, and Community Development.' It is a new and state-of-the-art academic medical center in Doha, Qatar. Work at Sidra was designed to focus on three key areas: World-class health care for women and children; Medical education; and Biomedical research.[87] Sidra represents the vision of Her Highness Sheikha Moza bint Nasser, who is Sidra's chairperson, and Sidra has been designed to become a center of the highest international standard with the latest medical equipment and laboratories to further knowledge and clinical advancement. It is her vision that Sidra is ranked as one of the most advanced research hospitals in the world, setting new standards specifically in

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[87] Sidra Fact Sheet, accessed online Nov 20 2015, at http://www.sidra.org/fact-sheet-patient-centric-technology/

women and children's health care,[88] while also helping to build both Qatar and the Gulf region's scientific expertise and resources.

Sidra has an academic partner in Weill Cornell Medical College in Qatar (WCMC-Q), and Sidra will also be a primary teaching facility for WCMC-Q, offering students the chance to both develop clinical skills and participate in biomedical research. Researchers who work at Sidra may have academic appointments at WCMC-Q, for example. Sidra will specifically support investigations pertaining to women and children's health in accordance with the 'Qatar National Research Strategy.' Sidra will thus further the understanding of both the genetic basis for common and rare disorders as well as the environmental or biological factors that influence their etiology.

An American architectural firm, Pelli Clarke Pelli, created the breathtaking design for the Sidra complex. The towering structure of steel, glass, and white ceramic tiles was chosen to yield the ideal environment for tranquility, privacy, and healing. The building design also incorporates three towering atria that also act as "indoor healing gardens," which each patient can see from their luxurious private room, which will incorporate soothing water features and be adorned with an "impressive art collection."[89] The Sidra development has not been untarnished by controversy, however.

A set of sculptures by British artist Damien Hirst that depict the stages of human life development, from fetus to birth, including 14 fetuses, were commissioned for the Sidra entrance area. The series chronicles the development stages from conception to

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[88] Breastfeeding, for example, is a key issue for Qatar, and during world breastfeeding week 2015, Sidra issued an infographic, to help women be able to both breastfeed and return to work. See, http://www.sidra.org/wp-content/uploads/2015/08/sidra-breastfeeding-infographic-english.pdf

[89] Sidra Fact Sheet, accessed online Nov 20 2015, at http://www.sidra.org/fact-sheet-patient-centric-technology/

birth and is completed with a 46-foot bronze statue of a baby boy. The statues were reported to have cost $20 million,[90] and *The New York Times* reported[91] that "[a]lthough the sheikha declined to confirm or deny the reported cost of Mr. Hirst's sculptures, she said the outlay was 'not a crazy number.'" The concerns that the statues raised were not in relation to the cost, however, rather the exposure of the naked body posed a challenge to Qataris' tastes.

When I arrived at Sidra to interview a senior manager in December 2016, I was excited to visit the exhibit and take some photographs. When I couldn't find the statues, I asked several of the reception staff how I could view the statues. They told me that the statues were covered up and no longer on display to the public. Surprised, I asked why this was the case. At least three staff at Sidra confirmed, "the older generation didn't like it." They consider pregnancy and the body to be a private domain, and the statues offended their sensibilities. I mention the covering of the Hirst sculptures here as a moment of disruption that reveals the tensions at play within Qatari society: the state is fast globalizing, importing elite global art, and challenging older traditions, industries, and moral commitments. While from a distance the scientific development plans of Qatar appear to be proceeding quickly and successfully, there are challenges and difficulties as Qatar evolves socially and culturally.

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[90] "Damien Hirst Unveils Provocative Birth Sculptures In Doha," *The Daily Beast*, Oct 11 2013, accessed Jan 20 2017, http://www.thedailybeast.com/articles/2013/10/11/damien-hirst-s-controversial-sculptures-in-doha.html

[91] "Art, From Conception to Birth in Qatar: Damien Hirst's Anatomical Sculptures Have Their Debut," *The New York Times*, Oct 7 2013, accessed Jan 20 2017, at http://www.nytimes.com/2013/10/08/arts/design/damien-hirsts-anatomical-sculptures-have-their-debut.html

Sidra's Imagined Future

The Sidra development is located at the heart of Education City, which is the main development project of the "Qatar Foundation." The Qatar Foundation, which is a private, independent, nonprofit organization, was founded in 1995 "to support the development of national centers of excellence and position Qatar as a global leader in innovative education and research." The Sidra building contains a research division budget for five years of $709,714,000 and provides over ten thousand square meters of research labs.

Here I will discuss the vision outlined in the Sidra 5-Year strategic plan (2015-2020),[92] which was published in August 2014. Sidra is part of Qatar's "2030 national vision to turn Qatar into a knowledge-based society at par with most technologically advanced countries" (3). While Qatar has already reached a high standard in computing, engineering, transportation and IT, medicine and biotechnology lag behind. Sidra will address the gap with innovative biomedical technologies and outstanding medical care. The Sidra project is likewise intended to play an autonomous role in developing and testing novel ideas, in line with the Qatar National Research Strategy (QNRS), and National Health Strategy (NHS). Sidra will be integrated into the existing healthcare system and will cooperate with other Qatari institutions, for example, by according tissue samples and research materials. In this sense, Sidra is relatively open to collaboration with the outside and is envisioned as being integrated into the fabric of Qatari society, as well as a global research infrastructure.

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[92] Sidra 5-Year strategic plan, accessed online Nov 20 2015, at http://www.sidra.org/wp-content/uploads/2014/12/sidras-five-year-strategic.pdf

Sidra's three key goals are to "prioritize translational research; state of the art training for Qataris; and support clinicians to practice personal medicine." In fact, most of the efforts of the research branch will be in the area of personalized medicine. Sidra is, therefore, building capacity for Qatar in biological research, but it is also a part of a conscious nation-building project. The plan (6) explicitly states, "*Qatarization* remains Sidra's ultimate goal in capacity building" (my emphasis). Consequently, the development of Sidra will yield a vibrant international academic community and will draw "top scholars independent of their nationality of origin to create and sustain a global community of leaders in the biomedical field."

But outside of the scientific development, how does Sidra help build the imagination of a national community? What exactly is *Qatarization*? *Qatarization* is a government initiative to get Qatari citizens working in the public and private sectors at a higher rate. For example, the *Qatar Tribune* (Dec 18 2016; See Figure 7) reported that the Customs authority has achieved 95% *Qatarization*. *Qatarization* does not merely mean a numerical achievement but also involves training Qataris in new skills, particularly IT, so they can contribute to the technological advancement of the state.

16 Qatar Tribune Sunday, December 18, 2016 The Last Word

Customs authority achieves 95% Qatarisation

QNA
DOHA

THE General Authority of Customs (GAC) has reached 95 percent Qatarisation in its human resources, rep-

structures of the entity, as well as a plan to normalise the corporate culture, resulting in strengthening the administrative and financial regulatory systems and targeting 40 employees to com-

GAC and the Qatar Chamber have signed a memorandum of understanding to implement rehabilitative training programmes for the customs brokers, resulting in the evolution in the number of cus-

The GAC plans to switch the manual procedures applied by the customs to an electronic version, amend the time of release according to the processes approved by the global customs, set up an alternative information centre for road transport.

switch the manual procedures applied by the customs to an electronic version, amend the time of release according to the processes approved by the global customs and set up an alterna-

for the authority, establishing a modern centre to meet the needs of theoretical and practical training, presenting a project to build a customs lab and setting up an electronic custom inquiry

Figure 7. Qatarization of Public Jobs. Newspaper headline from the *Qatar Tribune*, Dec 18 2016.

The flow of foreign migrant workers to Qatar poses a challenge to state initiatives like *Qatarization*. In other industries, like the biosciences, Qatar is drawing top talent from around the world, potentially reducing the industry's Qatari proportion. However, it seems to be part of Qatar's vision to attract expertise from around the globe, and bring talent to Qatar. In the biomedical research, however, Qataris themselves become a valued object of study. Sidra's strategic plan addresses the biological nature of the Qatari population, saying (Sidra 5-Year strategic plan:6):

> "the uniqueness of the Qatari/Arab population provides a special strength for the study of population structures, functional annotations of large homozygosity regions and other investigations at the interface between genetics and biological function that can be best studied in endogamous populations. It should be noted that while other large population studies have focussed on quite homogeneous populations such as the inhabitants of Iceland, the structure of the Arab people is unique, diverse and complex with influences from historical migrations since the dawn of civilization. Therefore, the richness of genetic information obtainable by studying Qatari/Arab people is a major asset for the world."

The plan emphasizes both the special features of the Qatari population as a biological object, as well as the commonality that Qataris share with the greater 'Arab people.' The Qatari population is both unique and similar to the Arab population. It claims both particularity and a dimension of universality that echoes an ideology of pan-Arabism and industrial development.

One of the 'Grand Challenges' of the Sidra project (11) is to determine the "genetic structure" of the population, incorporating disease prevalence or predisposition and accurate phenotyping of the population. The strategic plan document sends a mixed message about the genetic nature of the Qatari population. It states (37) that "Qatar has probably the most diverse patient population in the world," even while it is supposed to be unique due to its history of endogamy. Regardless of this ambiguity "many Qataris share recent common ancestry and also have large families" (47) making it easier to identify the underlying basis of genetic disorders that present as fetal anomalies. Sidra will also build a center for genetic and genomic medicine (47) since "the population of Qatar has a high consanguinity rate (54%) and an elevated incidence of recessive genetic disorders." Part of this center's key activities is a plan to "develop a prenatal whole genome sequencing research program" (48).

It is thought that this program will "reduce the burden of childhood disease associated with autosomal recessive single gene disorders." One of the most ambitious aims of the Sidra development is a plan to (52) "do whole genome sequencing (WGS) of 10,000 Qataris (3% of the Qatar Genome project)." This target is the largest international genome project of its time, comparable to the sequencing project of the England Genome project in terms of the amount of data generated. This large-scale genomic sequencing will yield a high-resolution characterization of the Qatari genome structure, the first Qatar-Middle East genome reference, a robust neonatal screening and assessment of genetic disorders prevalent in Qatar, and the establishment of a model for the study of complex diseases.

These goals point towards a larger Qatari genome project, which for this study necessitates a look at the 'Qatar Genome Project,' an effort to determine the genetic nature of the Qatari population. But genomic science in Qatar is not an exclusively Qatari activity. Rather, many of the scientific specialists listed on the website are foreigners, particularly Europeans.

As mentioned, Sidra's 2017 annual conference was titled "Functional Genomics and Beyond: Nature via Nurture," the aim of which was to address "one of the oldest and most challenging questions in science.” Following major advances in precision medicine, it was noted, it is becoming clear that genetics plays a key role in disease causation and risk predisposition. And while individual selves are programmed by their unique genome, ‘nurture’ factors like diet, lifestyle, and the environment are also essential factors in determining health and illness. The symposium brought scientists and clinicians from around the globe to present the latest discoveries on the interactions between nature and nurture, and how these complex interactions are implemented in healthcare practice.[93]

This symposium was organized as part of the Sidra Symposia Series and was directed towards academia, researchers, physicians, healthcare providers and regulatory agents involved in the field of genomics and genomic medicine.[94] The 2017 program poster featured green trees growing in pairs, twisted into double helices, and held together in shape by cross branches (Figure 8).

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[93] http://events.sidra.org/event/functional-genomics-symposium-2016/ accessed Dec 18 2016

[94] http://events.sidra.org/event/functional-genomics-symposium-2016/ accessed Dec 18 2016

Figure 8. Functional Genomics and Beyond: Nature via Nurture. Symposium poster, reproduced, with permission, from Sidra. Accessed Jan 11 2016, at http://www.sidra.org/sidra-symposium-functional-genomics-and-beyond/

This seemingly ‘unnatural’ configuration echoes the double helical structure of the DNA molecule, but the way the green tree, typifying nature, is contorted into a helix gestures to the way in which nature unfolds in a context in which genetic determinism is constrained by guiding and disciplining factors. In the poster, the trees stand upright and lush with the help of the partner helix. This image thus also narrates the scope of the conference, specifically the massive jump in scale that functional genomics seeks to make: by depicting DNA as a key agent in holding the trees up, it is suggested that DNA is a legible agent that directly links the molecular scale to the macroscopic scale. In other words, molecular genetics explains the patent observations one can see with the naked eye. Moreover, when all is in order, the tree grows strong and tall and flourishes. The bunches of healthy green leaves thus subtly conveyed the project of genetic meliorism.

One of the speakers at the conference was Myles Axton, the chief editor of the journal *Nature Genetics* (which sponsored the symposium), who also spoke at the 2015 meeting, at which he urged the Qatar Genome Project to publish their data in a public database. During his 2016 lecture, he mentioned the work on precision medicine emerging from Saudi Arabia, one of Qatar's rivals in the field of functional genomics. He specifically mentioned the then current issue of the top scientific periodical *Science*, which published an article on the clinical application of functional genomics in relation to inheritable disorders in Riyadh (Kaiser 2016). The article was titled "When DNA and culture clash," but the cover of the issue featured the title "Family Ties: Saudi Arabia strives to prevent genetic disorders" (See Figure 9).

Figure 9. Family Ties: Saudi Arabia strives to prevent genetic disorders. Cover of *Science Magazine*, Dec 8 2016. Reproduced with permission from the American Association for the Advancement of Science.

The *Science* article is a profile of a young Saudi clinical geneticist, Fowzan Alkuraya, who recently returned from the United States to Saudi Arabia, and who also gave a lecture at the Sidra 2015 and 2016 conferences that I attended. The author addresses how genetic disease in Saudi Arabia is actually an entanglement of kinship practices and genetic determinism, or in the editorialized glossing, a clash of DNA and culture. Strong adherence to tradition “helps explain why about 40% or more of native Saudis—two-thirds of the country's 30 million people—still marry first cousins or other close relatives…. helping preserve wealth and tribal ties.” The cost of this tradition of consanguineous marriage, Kaiser reports, “is a relatively high risk for recessive genetic diseases, which develop when both the maternal and paternal copy of a gene are faulty.”

In Saudi Arabia, where large families are still common, “the genetic dice are rolled repeatedly” and “[b]y one estimate, 8% of babies in Saudi Arabia are born with a genetic or partly genetic disease, compared with 5% in most high-income countries” (Kaiser 2016). The same article also includes a short insert on the developments in genetic medicine in Qatar, titled “Qatar’s genome effort slowly gears up.” This insert reports that there have been difficulties with the issues of data sharing and privacy in Qatar, saying

> “so far, no outside researchers have gotten their hands on the information, as QGP officials and scientists wrestle over data access issues. These issues include how to prevent the DNA sequences from being downloaded onto other computers or accessed from outside Qatar, and who should be liable if people’s genetic or clinical information gets stolen” (Kaiser 2016:1220).

My conversations with senior leaders at Sidra confirmed these challenges, which admittedly have made it difficult for smooth collaboration between Sidra, the Qatar National Biobank, the Qatar Genome Project, and other stakeholders. In particular, several parties disagree over who should be legally responsible for protecting the human genomic data they jointly generate.

The Qatar Genome Project

Sidra is also supported by an external Qatari organization, the Qatar Genome Project (QGP).[95] The QGP uses exome (coding DNA that determines a specific phenotype) sequencing to identify risk variants for Mendelian disorders that are at a high prevalence in Qatar. They have already sequenced the DNA of 100 Qatari nationals, "representing the three major ethnic subgroups of the country": Bedouin, Persian-South Asian, and African descent. Recent research at Sidra has described the genetic structure of the Qatari population, shedding light on its diverse origins. By tracking the Y-chromosome lineage of the population (patrilineal descent), the population is understood to have a Bedouin (Q1), Persian-South Asian (Q2), and African (Q3) component (See Figure 10).

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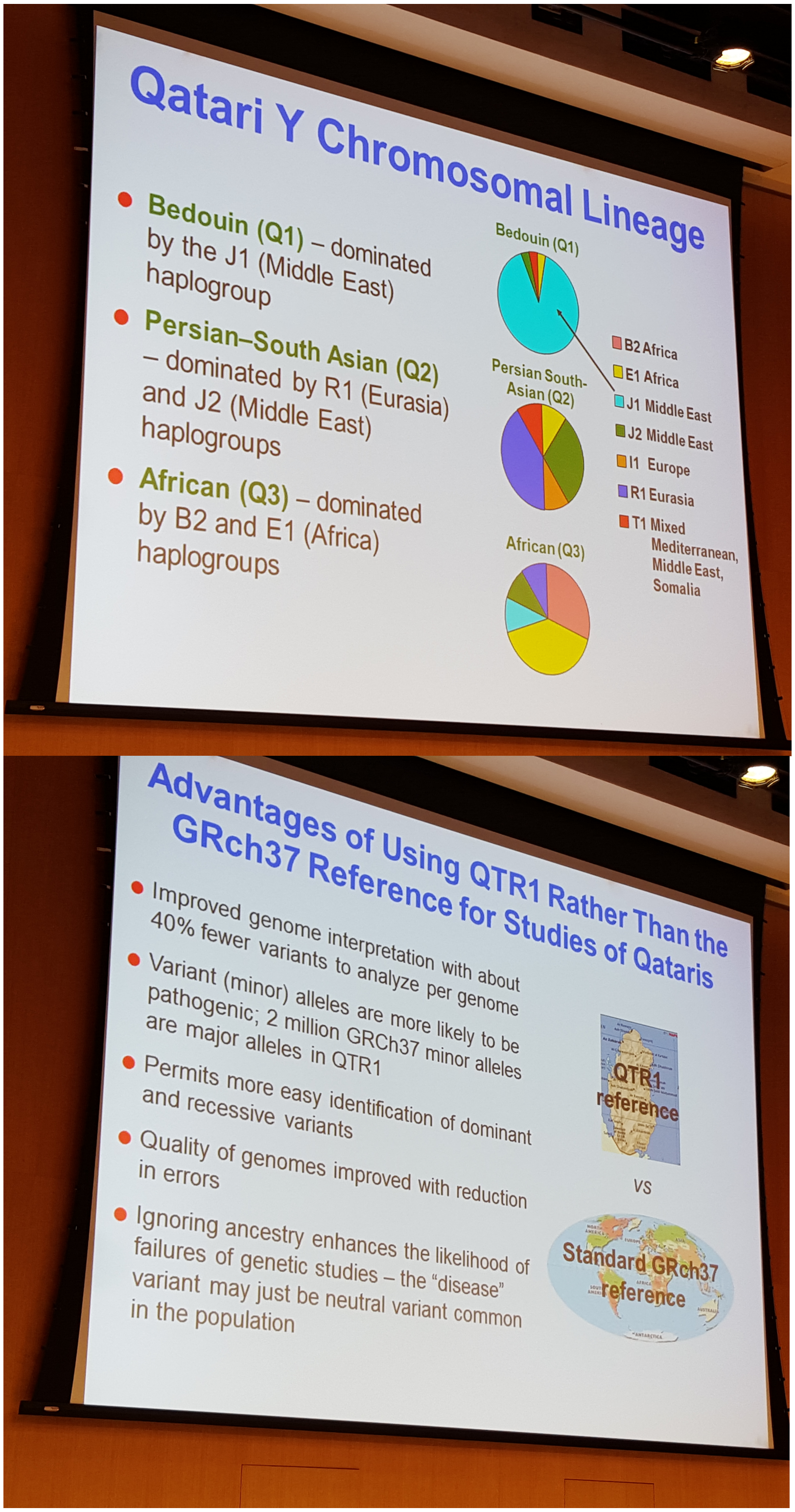
[95] Qatar Genome Project (QGP), accessed online Nov 20 2015, https://qatar-weill.cornell.edu/media/reports/2013/qatariGenome.html



Qatari Y Chromosomal Lineage

- **Bedouin (Q1)** – dominated by the J1 (Middle East) haplogroup
- **Persian–South Asian (Q2)** – dominated by R1 (Eurasia) and J2 (Middle East) haplogroups
- **African (Q3)** – dominated by B2 and E1 (Africa) haplogroups

Advantages of Using QTR1 Rather Than the GRch37 Reference for Studies of Qataris

- Improved genome interpretation with about 40% fewer variants to analyze per genome
- Variant (minor) alleles are more likely to be pathogenic; 2 million GRCh37 minor alleles are major alleles in QTR1
- Permits more easy identification of dominant and recessive variants
- Quality of genomes improved with reduction in errors
- Ignoring ancestry enhances the likelihood of failures of genetic studies – the "disease" variant may just be neutral variant common in the population

Figure 10. Haplogroups in the Qatar population, and a Qatari reference genome. Photo by author. These slides were part of a presentation by Khalid Fakhro during the 2016 Sidra functional genomics conference in Education City, Doha.

While the ethnic identity of these components of the population is not presented to be of great biomedical significance in itself, understanding the genetic diversity of the population is essential if disease markers are to be distinguished from the natural genetic diversity within the population as a consequence of its diverse origins. This makes a Qatari reference genome critical in the effort towards identifying the genetic basis of disease in the Qatari population. By analyzing individuals' exomes and correlating the genetic data with the online databases of the 1000 Genomes Project, the researchers have already identified the common variations that relate to disease in the Qatari population. One reason for these findings is that Qatari society has historically encouraged consanguineous marriage, which raises the frequency of monogenic diseases. Dr. Ronald Crystal, of the Qatar genome project, said[96]:

> "Disorders are present in all populations around the world, so it's not the case that Qatar is different. Qatar is only different in that its variations and the frequency with which they occur are unique to its population. By finding out what these variations are and taking appropriate action we can save people from the trauma of some very unpleasant disorders. We're talking here about things like brain malformation, diabetes, blindness, deafness, cardiovascular disorders, inflammatory disorders and many other conditions. While these conditions are not common, they do occur, some are untreatable and many are very difficult to live with, for both the sufferer and their families."

Following the identification of certain disease markers, it is thought that these diseases may be eradicated through pre-marital counseling and screening. Parents could undergo screening to see if the parents carry the genetic variations that cause disease. The individuals that carry the disorder would not necessarily have the conditions, but they could carry and transmit the recessive genes to their offspring. As of now, pre-marital

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[96] Qatar Foundation, Press Release, Jan 18 2014, 'Mapping The Qatari Genome Points Way To Prevention Of Inherited Diseases,' accessed Sep 25 2017, at https://www.qf.org.qa/news/mapping-the-qatari-genome-points-way-to-prevention-of-inherited-diseases

counseling in Qatar only screens for four genetic variations, while the recent study found 37. Crystal further explained the possible practical applications of the study[97]:

> “With more comprehensive screening, people will be able to make more informed choices about whether they feel it’s safe to have children together…Alternatively, it is possible to screen the fertilized eggs for variations that cause disorders before they are implanted. The improved screening can also be useful for adults who can change their lifestyle to prevent themselves from developing diseases. For example, if I analyze your DNA and tell you you’re susceptible to having elevated accumulation of lipids – cholesterol and triglycerides that can cause cardiovascular disease – then you could alter your diet and take care to take plenty of exercise to mitigate the risk.”

In order to reach a point where robust statistical associations can be made, large-scale biobanking must be established first, where the DNA and medical data from a significant section of the population can be correlated and analyzed effectively. Indeed, there is a separate entity in Qatar called the ‘Qatar Biobank,’ which is the essential device in collecting samples and data to fuel the genome project.

The Qatar Biobank

Qatar Biobank[98] is a separate entity from Sidra, but it is related in its goals, activities, and funding structure. The Qatar Biobank is a center within Qatar Foundation. It was created by Qatar Foundation in collaboration with Hamad Medical Corporation[99]

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[97] ‘Mapping The Qatari Genome Points Way To Prevention Of Inherited Diseases,’ accessed Sep 25 2017, https://www.qf.org.qa/news/mapping-the-qatari-genome-points-way-to-prevention-of-inherited-diseases

[98] Qatar Biobank, accessed online Oct 25 2015, http://www.qatarbiobank.org.qa/about-us/what-is-qatar-biobank

[99] Hamad Medical Corporation (HMC) “has been the principal public healthcare provider in the State of Qatar for over three decades, and is dedicated to delivering the safest, most effective and most compassionate care to each and every one of our patients. HMC manages eight hospitals, incorporating five specialist hospitals and three community hospitals… While HMC continues to upgrade its facilities and services, it has also embarked on an ambitious expansion program, targeting the areas of need in our community.” Hamad Medical Corporation website, accessed Nov 28 2015,

and the Supreme Council of Health with the broad goal of furthering medical research on Qatari health issues. Its pilot phase began in 2013, and since 2014 it is in the biobank initiation phase (Figure 11).

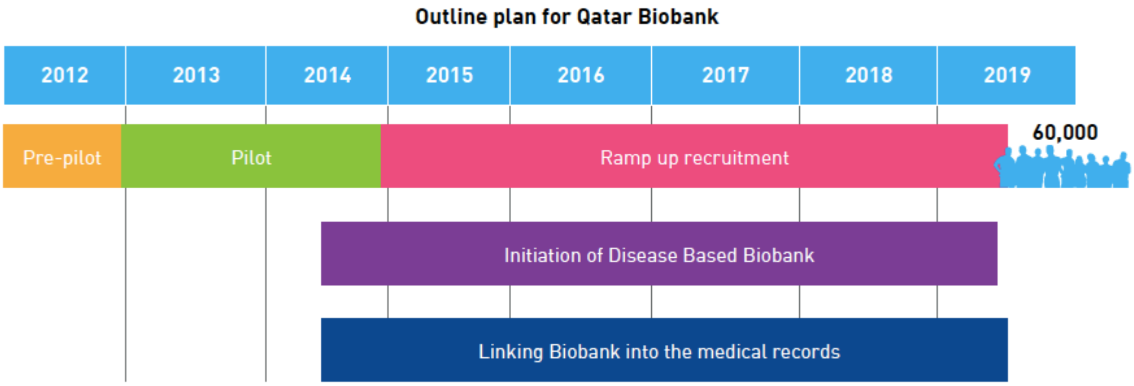

Figure 11. Timeline for the development of the Qatar Biobank. Reproduced, with permission, from Qatar Biobank, 2015 Biobank report, p.13, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1301

Though the Qatar Biobank is a collection of samples and information on health and lifestyle members of the population of Qatar, the Biobank also offers research opportunities for Qataris as well as scientists and clinicians from the region and the world. Qatar Biobank aims to become both a resource for Qatar and a globally recognized and competitive institution. It aims both to further research that will benefit the Qatari population and to offer opportunities for Qataris to participate as donors or as professional researchers and clinicians. Its website states “Qatar Biobank is a scientific and altruistic partnership between the research community and the people of Qatar to build a better, healthier future for generations to come.”[100] Its principal mission is to “act

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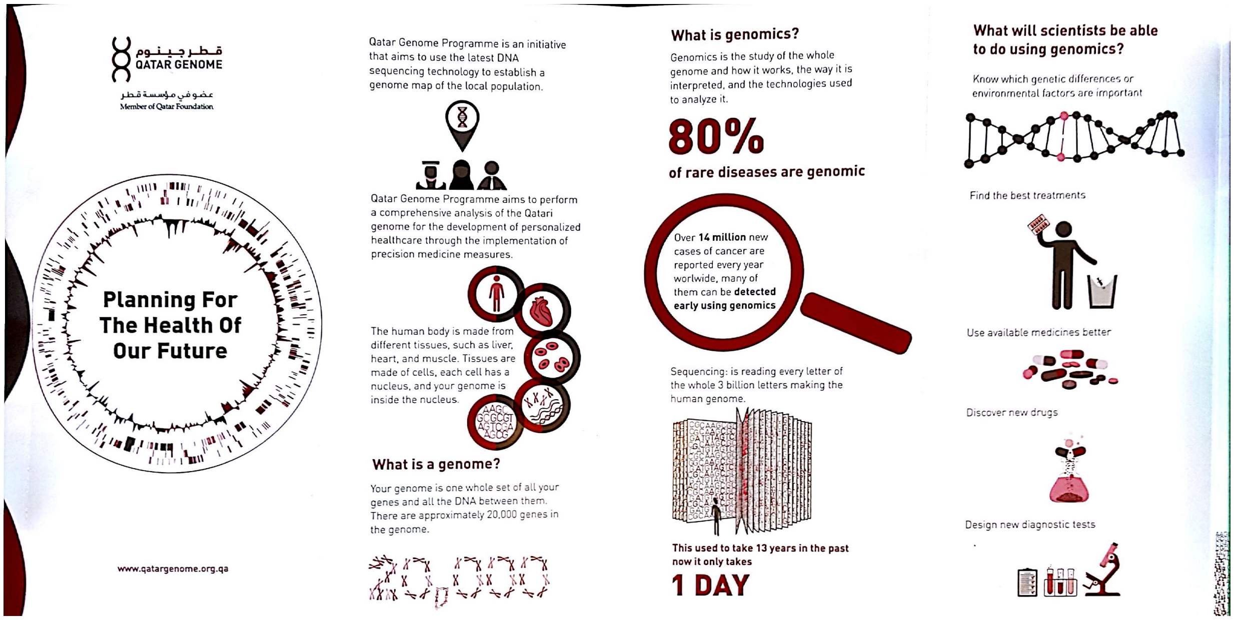
https://www.hamad.qa/EN/About-Us/Our-Organization/Pages/default.aspx

[100] Qatar Biobank, general information leaflet, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/436

as the Qatar National Centre for biological samples and health information to enable research towards the discovery and development of new healthcare interventions."

Qatar biobank will focus on the following research areas: Genomic Medicine & Systems Biology; Diabetes; Cancer; Medical Genetics; Obesity/metabolic syndrome; Respiratory; Nutrition; Mental Health; Cardiovascular disease; Cognition; and Health and socio-economic status.[101] Qatar Biobank had an exhibit at the 2015 and 2016 Sidra functional genomics symposia, and at the 2016 symposium, I took one of the brochures they made available to visitors (See Figure 12), which was titled "Planning For The Health of Our Future."



قطر جينوم
QATAR GENOME
عضو في مؤسسة قطر
Member of Qatar Foundation

Planning For The Health Of Our Future

www.qatargenome.org.qa

Qatar Genome Programme is an initiative that aims to use the latest DNA sequencing technology to establish a genome map of the local population.

Qatar Genome Programme aims to perform a comprehensive analysis of the Qatari genome for the development of personalized healthcare through the implementation of precision medicine measures.

The human body is made from different tissues, such as liver, heart, and muscle. Tissues are made of cells, each cell has a nucleus, and your genome is inside the nucleus.

What is a genome?

Your genome is one whole set of all your genes and all the DNA between them. There are approximately 20,000 genes in the genome.

What is genomics?

Genomics is the study of the whole genome and how it works, the way it is interpreted, and the technologies used to analyze it.

80%
of rare diseases are genomic

Over **14 million** new cases of cancer are reported every year worlwide, many of them can be **detected early using genomics**

Sequencing: is reading every letter of the whole 3 billion letters making the human genome.

This used to take 13 years in the past now it only takes
1 DAY

What will scientists be able to do using genomics?

Know which genetic differences or environmental factors are important

Find the best treatments

Use available medicines better

Discover new drugs

Design new diagnostic tests

Figure 12. Qatar Biobank Brochure. The foldable brochure was published in English, with Arabic on the reverse, and was titled: "Planning For The Health Of Our Future." Reproduced, with permission, from Qatar Biobank.

The deictic "Our" can be presumed to denote the Qatari self-referential 'We' and addresses Qatari citizens as part of both a nation and a biological collective within a

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[101] Qatar Biobank Research Focus Areas, accessed Nov 28 2015, at http://www.qatarbiobank.org.qa/research/research-focus-area

national temporal frame of progress towards improved health and indeed a healthy, prosperous, future. The ‘sociotechnical imaginary,’ to draw on the idiom of Jasanoff and Kim (2015), at play bridges incontestable biological facts like “the body is made from different tissues…your genome is inside the nucleus” and so on, to knowing “which genetic differences or environmental factors are important” to deliver “new drugs… new diagnostic” tests. This could be read as the universal narrative of global science and its promise of progress, but in this instance it is mobilized within the context of Qatari national development, addressing, indeed interpellating, Qatari citizens selectively.

To this end, the Qatar Biobank will be both a platform and a driver of health research as it recruits large numbers of the Qatari population to donate biological samples as well as information about their health and lifestyle. But probably the greatest health concern for the Qatari population is obesity, and consequently diabetes. An initial report of the Qatar Biobank reported, “17% of our adult population suffers from type 2 diabetes.”[102] The Qatar biobank published findings from a pilot study that addressed the physical activity of Qataris and the dominant reasons for clinical referral.[103] The study report is based on research between September 2013 and October 2014, with 1,200 samples collected during Qatar Biobank’s pilot phase.[104]

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[102] Qatar Biobank, general information leaflet, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/436

[103] Qatar Biobank, Pilot Phase Findings, accessed online Nov 28 2015, at http://www.qatarbiobank.org.qa/research/pilot-phase-findings

[104] Qatar Biobank, Pilot Phase Report Summary, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1288

In terms of physical activity, it found that the following facts[105]: 80% of the sample population reported no level of moderate physical activity per week (77% of males and 86% of females reported no moderate physical activity per week); 67% of the sample population (61% male, 70% female) reported walking less than 2 hours per week for leisure; 55% of the males sampled reported working in an office-based environment, which leads to inactivity; and 42% of the males sampled reported watching TV and using computers for more than 4 hours per day compared to 38% of females sampled.

In relation to clinical referral, the Qatar Biobank reports: 373 (70%) of the participants were unaware that they had a disease; 25% of referrals were due to abnormal bone density and low blood calcium rates; 19% of referrals were due to dyslipidemia (high cholesterol); 18% of referrals were due to diabetes; and 17% of referrals were due to high blood pressure.

The initial study also reported on the levels of obesity and risk of cardiovascular disease in the Qatari population: 73% of the sample population were classified as overweight and obese; 37% of the population was classified as obese; 37% of the population has borderline or high levels of total cholesterol; and 76.6% of male and 70.4% female participants are at risk of developing cardiovascular disease due to being overweight/obese. Of these participants 864 are male participants and 1,142 are female, and all age groups were represented in the sample. However, the majority of the participants were between 22 to 38 years old.

It should be noted that the distribution of samples collected is not proportionally representative of the demographics of Qatar, which would put both women and Qataris in

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[105] Qatar Biobank, Pilot Phase Findings, accessed online Nov 28 2015, at http://www.qatarbiobank.org.qa/research/pilot-phase-findings

the minority. Rather, it seems, for whatever reason(s), the sample is roughly equal between male and female donors, while Qatari participants stand at 2,360, in contrast to non-Qatari participants, who number fewer than 700 (Table 2; Figure 13). In the demographic sense, the biobank is not a representative assemblage of the residents of the territory under Qatari sovereignty.

	Number of Participants	**Number of Samples**
Total	3,022	234,157
Male	1,594	126,322
Female	1,428	107,835
Total Qatari Participants	2,360	158,739
Male Qatari	1,179	86,158
Female Qatari	1,181	72,581

Table 2. Qatar Biobank Participant Data. Between January 2013 and January 2015, "3022 participants have provided a total of 234,157 samples. From these figures 2360 of the participants who provided a total of 158,739 samples are Qatari."[106]

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[106] Qatar Biobank Key Figures, accessed Nov 28 2015, at http://www.qatarbiobank.org.qa/research/key-figures

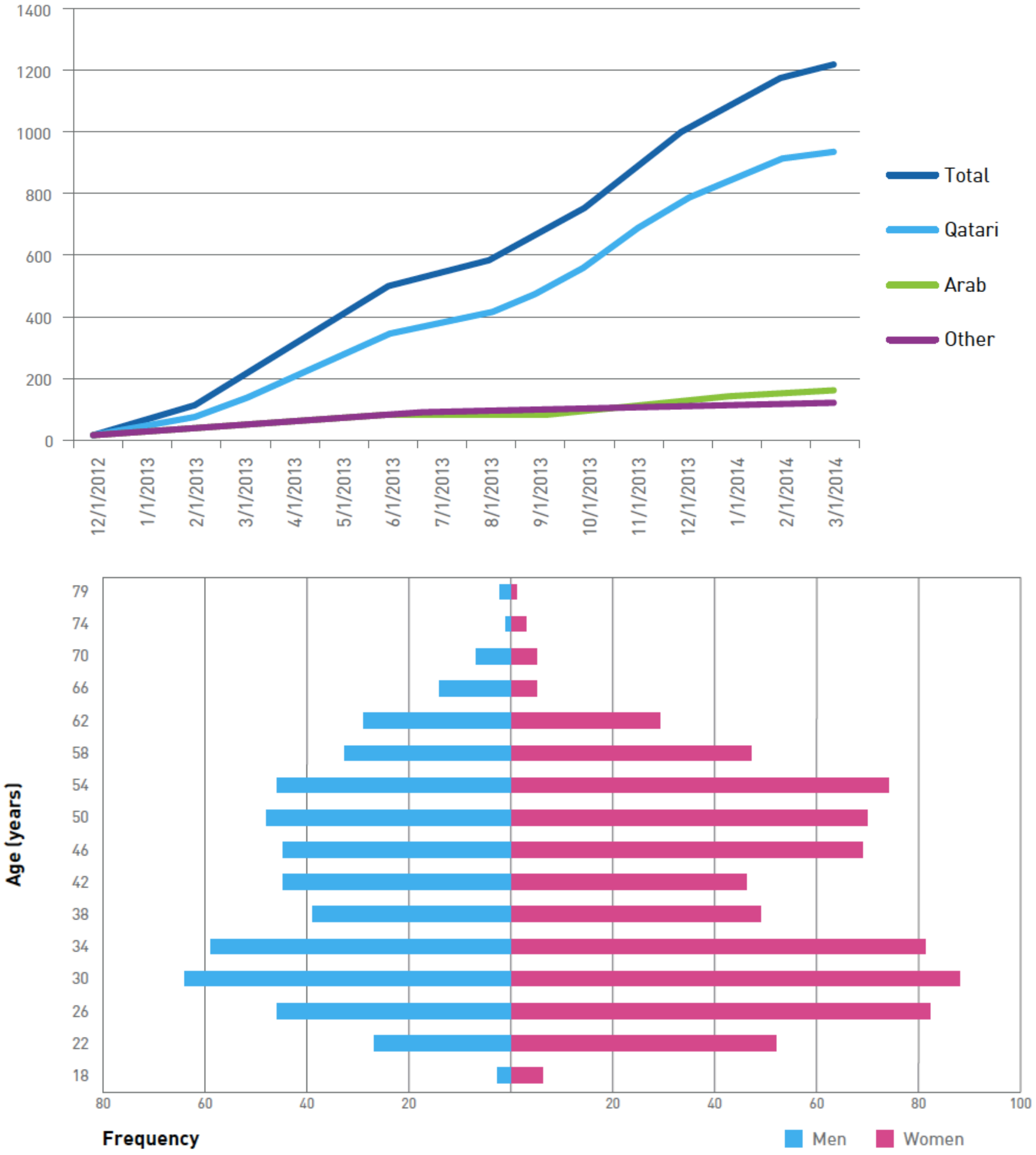

Figure 13. Recruitment and participation in Qatar Biobank's pilot phase. Top: Ethnic background of participants. Below: Age and gender of participants. Reproduced, with permission, from Qatar Biobank, 2015 Biobank report, p.14, p.16, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1301

Qatar Biobank aims to recruit more than 60,000 participants by 2019.[107] Any adult (over 18 years) who is either a Qatari national or long-term resident (having lived in Qatar at least 15 years) can contribute to Qatar Biobank. As of January 2015, Qatar Biobank has recorded 2,006 participants, 1,500 of whom are Qatari, and 506 of whom are long-term residents.[108] To register online for an appointment with the biobank requires a Qatari identification card number. The process takes around 3 hours and involves the donation of samples of urine, saliva, and blood, and undergoing a series of measurements (height, weight, grip strength, blood pressure, body composition, heart and lung function). Participants are also complete a questionnaire. The Biobank currently has over 1,200 samples and celebrated its four-year anniversary in February 2018.

The Qatar Biobank is imagined to become a valuable national resource for Qatari health. As genetic and health information and samples contributed grow in number, researchers will be able to study how lifestyle, environment, and genes affect health and illness. The knowledge produced could help in the development of better medical treatments and disease prevention measures for Qataris or future generations. The Qatar Biobank website claims that till now most medical treatments have been developed through the study of Western populations and that there has been a lack of large-scale research on populations in Qatar or in the region. Qatar Biobank is one of the most ambitious biobanks in the region, and it aims to play a key role in helping prevent and improve treatment of diseases that affect Qatari populations. Further, the knowledge produced by the Qatar Biobank, they claim, will lead to tailored healthcare and

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[107] Qatar Biobank, Pilot Phase report summary, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1288

[108] Qatar Biobank, Pilot Phase report summary, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1288

personalized medicines.

The Qatar Biobank's 2015 report states that it "will chart a road map for future treatment through personalized medicine."[109] Dr. Asma Al Thani, Vice Chairperson of Qatar Biobank's Board of Trustees, states "Qatar's scientist and research community recognizes the current shift from traditional genomics, as the mapping of an individual's DNA, to the population-based studies institutions across the world."[110] Qatar Biobank thus situates itself at the forefront of genetic research and recognizes the shift from traditional genetics and biobanking to genomic analysis, entailing the search for disease biomarkers for personalized treatments. But what kind of population does the biobank imagine when it collects samples and presents public health data? The gender, ethnic, and age distribution pyramid for the initial participants (Figure 13) is starkly different from the population pyramid for the whole population (Figure 6).

The population that is selected and imagined through the initial biobank study resembles a 'normal' society. The biobank population pyramid has a wide base that comprises youth with a decrease in numbers as age rises, and a relatively balanced gender distribution. Since Qatar's population is heavily composed of migrant workers, or non-citizens, its demographic structure is heavily composed of men in their 20s and 30s. The way in which the biobank has selected participants, or for whatever reasons only certain elements of the population have had a chance to be represented, may be criticized for failing to provide a sample that roughly corresponds to the population's diversity. But reading this phenomenon as a cultural artifact, it is clear that the biobank is acting as a

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[109] Qatar Biobank, 2015 Biobank report, p.7, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1301

[110] Qatar Biobank, 2015 Biobank report, p.7, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1301

site through which a ‘normalization,’ or more precisely, *Qatarization*, of the population structure can be imagined. Indeed, the demographic anxiety about a large segment of the population threatening the national dominance or identity of the Qatari nationals may be assuaged by assembling public health data in a way that presents a picture of the population that foregrounds Qataris and their dominance in the demographic structure. This assembly of Qataris in the biobank is related to the development strategy of *Qatarization*.

Moral Community and *Qatarization*

The biobank offers a chance for Qataris to participate in the process of producing these data as ‘citizen scientists.’ Dr. Hadi Abderrahim, Managing Director of Qatar Biobank, sees the biobank as an opportunity to bring in the public as participants and as partners. He claims that

> “Qatar Biobank does not only aim at recruiting the public to take part in biomedical research, but also wishes to partner with our public and help them become “citizen scientists” who, through their personal contributions, play an active role in the process. As such, Qatar Biobank’s recruitment approach provides a model for public involvement in biomedical research and promotes Qatar’s dedication to raising awareness and commitment, engaging the community in shaping a better health of their future generations.”[111]

Dr. Hanan Al Kuwari, Chairperson of the Biobank, and Qatar Board of Trustees says that “Qatar biobank is a scientific and altruistic partnership between the research community and the people of Qatar to build a better, healthier future for generations to come.”[112] In

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[111] Qatar Biobank, 2015 Biobank report, p.8, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1301

[112] Qatar Biobank, general information leaflet, accessed Nov 28 2015, online at http://d1nkk4xtshu10a.cloudfront.net/app/media/436

his view, the biobank constitutes a relationship between the research community, which presumably extends far beyond Qatar, and the people of Qatar. The biobank is not conceived of as a state entity, or as a collective of Qatari interests. Instead, it emphasizes the relationship between Qatar and the global research community and puts Qatar as an equal with other biobanking nations and their associated research endeavors. It is the international biomedical research community that is considered the benefitting partner that is collaborating with the biobank and not the Qatari people themselves. Accordingly, the biobank states in relation to its research,

> "Qatar Biobank will make it possible for scientists to conduct research to address some of the greatest health challenges facing Qatar and the region, including cardiovascular disease, obesity, diabetes, and cancer."

The biobank and the research it will engender are presented as a great opportunity to the world's scientists. In addressing the specific benefits to the researchers, the biobank states that

> "The unique breadth and depth of the information and samples collected by Qatar Biobank on the population of Qatar will allow researchers to advance the understanding of local and regional health and disease to enable new and exciting developments in healthcare and medicine."[113]

But in asking the question as to what kinds of moral communities the biobank attempts to build, it is important first to address the ways in which the local actors have themselves tackled these questions. One way is to look at the role of Islamic ethics in biomedical research.

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[113] Qatar Biobank Research, accessed Nov 28 2015, at http://www.qatarbiobank.org.qa/research

Islamic Concerns

The biobank has made a *fatwa*[114] request to determine the moral, ethical, and legal implications of the biobank and its practices. The biobank leadership asked a series of questions, for example: is it "permissible in Islam to store biological samples for a long time after the death of the participants?"; is it "required to get the consent of the participants?"; does taking a blood sample nullify fasting; and is "donating samples an act of goodness and can it be part of Zakat and Sadaqa?"

They also asked to determine if the biobank is in keeping with Sharia law, and to determine "[w]hat does Islamic Sharia law say about fees to use preserved human samples."[115] The *fatwa* reported "[t]aking biological samples is permitted in Islam as long as their purpose is to serve research and studies that will benefit society and humanity" and declared that "[i]t is permissible to take, store and make use of these samples for research, whether during the life of the participant or after their death." However, it stated, "it is required to get the approval of the donor before taking the samples, and explain that they may be used in scientific research in their lifetime or after their death." It stipulated [t]he participant should be clearly briefed about the purpose for which the samples are to be used," emphasizing that "[t]his right is permanently exercised by the participant, even after the samples are taken from them, and they may withdraw their approval or require that they must not be used after their death."

The fatwa also advised people to participate "[a]s long as the purposes of this

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[114] An Islamic legal opinion, given by a qualified jurist.

[115] Islamic view for participation in the Qatar Biobank, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1165

research center in utilizing the participant's samples are useful and scientific."[116] The *fatwa* concluded "[m]ost Islamic Madhhabs (schools or doctrines of law) agree that drawing blood samples do not [*sic*] impact fasting."[117]As to whether giving samples is "part of Zakat and Sadaqa," the *fatwa* stated that "[g]iving samples supports useful scientific research and is categorized as an invaluable deed of goodness and acts of righteousness and piety" but stated that "it can't be described as charity or Zakat because there is no possession involved, as the samples are not owned by the research centers or researchers."

However, "[g]iving samples for research purposes can be regarded as charity as long as the samples or data are available for scientific research," and the *fatwa* stated that "[t]he donor will be rewarded if they have good intentions." The *fatwa* also furthered an opinion as to the guiding principles that the biobank had established. In accordance, the biobank's guiding principles governing the research include[118]:

- Biobanking should cause no harm.
- Biobanking should stick to transparency, the participant should know the purposes and uses of their samples.
- Biobanking should keep privacy and personal information discreet according to the preference of the participant.
- Biobanking should use the samples in research directly.
- The samples must be used for research that benefits society.
- The participant retains the right to withdraw their approval any time regarding the storage and gathering of samples and data.

In response, the *fatwa* concluded that

"[t]hese principles are aligned with Islamic Sharia law such as 'No harm

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[116] Islamic view for participation in the Qatar Biobank, accessed Nov 28 2015, at http://d1nkk4xtshu10a.cloudfront.net/app/media/1165

[117] Ibid.

[118] Ibid.

> for oneself and no harm for others, for seeking knowledge,' is a condition set by the particiapnt [*sic*]. These are all principles applied by Islamic Sharia law that adheres to every principle that applies to the general morality in common between all people."

The biobank also requested an opinion on what Islamic Sharia law says "about fees to use preserved human samples." The *fatwa* stated

> "[i]mposing fees on donations is not accepted in Islam as the bank does not have the right to sell them as these samples can't be owned. But if these fees are for administrative work such as sorting, storing, and other services that have nothing to do with possession or purchasing samples, Qatar Biobank is permitted to charge some fees for these services, but they can't be prohibitive, and can only cover the cost of administrative work."

One of the most challenging issues for Islamic ethics in relation to genomics is the management of incidental findings. Incidental findings are "results that arise although they were not part of the original purpose of the research project or clinical test." Such findings can be ethically problematic, since "they can be lifesaving, they can also lead to harmful consequences for the individual and community at large" (Ghaly *et al.* 2016:4). For example, finding a pernicious genetic marker in a certain individual, family, or community could spread stigma and make it difficult for individuals to find marriage partners. On the other hand, finding genetic markers that are shared amongst a wide group may also impinge on the limits of belonging and the imagination of relatedness. Indeed, splitting the Muslim nation into sub-groups based on genetic data would be problematic from the perspective of Islamic ethics. It would challenge the unity of the nation, in this case, the nation of Islam.

Identity Formation: the Imagination of the Nation

When it comes to marriage practices, tribal boundaries have been respected for a long time in the Arabian Peninsula. This means that inheritable diseases in the region are likely to be associated with identifiable tribal lineages, making the long tribal history of the region an important factor in the genesis of rare genetic disorders. Indeed, Saudi clinical geneticist Fowzan Alkuraya presented a slide at Sidra’s 2016 functional genomics conference that depicts the tribal identities of the Arabian Peninsula (Figure 14).

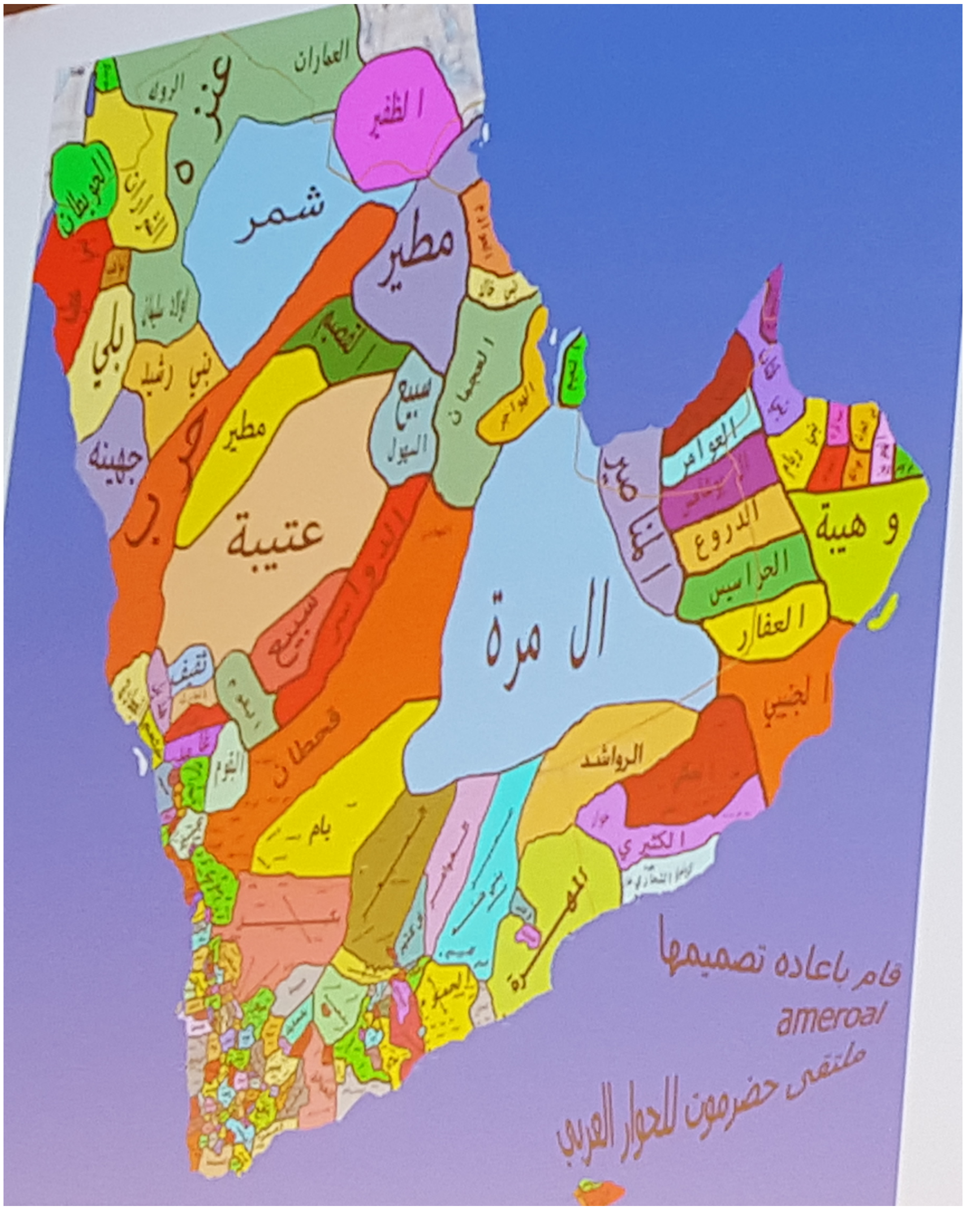

Figure 14. Tribal Identities in the Arabian Peninsula. Photograph by Ian McGonigle of slide presented by Fowzan Alkuraya at Sidra's 2016 functional genomics conference, Education City, Doha.

The impact of genome projects in the Arabian Peninsula on tribal identities is yet to be determined. For example, if certain diseases or benign biomarkers are identified and associated with specific tribal groups, then tribal identities will be able to draw on the genomic data as a verification of their authentic identity. On the other hand, incidental findings from genomic studies could show a high degree of admixture, evidence that could potentially challenge the oral narratives of endogamous groups. Indeed, the science could be appropriated as a rhetorical device in the service of a multitude of socio-political projects. What is interesting to focus on for the purpose of this study is the way in which the contemporary formal political organization of the Arabian Peninsula in nation-states overdetermines the way in which genomics of ethnic populations takes form in national genome projects that emphasize a relatively novel national character of the populations.

Genomics affords, indeed invites, the imagination of the nation as a real thing. Philosopher Slavoj Žižek (1993) equates the imagination of the nation with transference – or redirection – of the desire to reconnect with the vanishing symbolic 'other' via the mediated sign of the nation. The nation-state in his reading, which he calls the "Big Other," serves as an object of desire that one seeks to find identification with. In reading nation as fiction, he claims (1993:232): "'nation' is a fantasy which fills out the void of the vanishing mediator," providing an 'idea thing' that can be performed or enjoyed as a "Nation-Thing" – a national essence to be 'grasped' and 'enjoyed' as one's own. Genomics is emerging in Qatar at the same moment that the national identity is being established. This context of nationalism conditions the field of genomics to provide authoritative fictions that bolster the political establishment.

The imagination of a shared history in the new Middle Eastern States is not uncommon. It is usual for 'new' memories of 'ancient' historical events to be recruited for the purpose of nation-building. In Lebanon, for example, the myth of the ancient Mediterranean seafarers and traders, the Phoenicians, held great ideological traction in the minds of the Christian Maronites, who saw Lebanon as a natural Christian country. With the rise of nationalism in the 1850s, the Christian Maronites latched onto the vogue of discussing the history of the Phoenicians, who they presumed to be their natural ancestors. Historian of Lebanon Salibi recounts how the

> “archaeological exploration of the Phoenician past of Lebanon, first by French then mainly by Christian Lebanese archaeologists was politically geared – officially as well as by private initiative – to strengthening the theory that modern Lebanon was none other than ancient Phoenicia resurrected” (Salibi 1988: 172).

Similarly, in the case of Israel, historian of Israel Zerubavel states: “The construction of a myth of origins requires the twofold strategy of emphasizing a new beginning as well as discontinuity with an earlier past” (1995:43). But science, with its implicit claims to disinterested objectivity, can play a key role in bolstering the legitimacy of historical claims. Indeed, archeology was once the “identity-forming practice par excellence” (Feige 2009:100) that could identify artifacts as ‘objects of history,’ actants that embody forgotten stories and lost memories. Of archaeology in Israel’s early statehood years, Abu El-Haj (2001:18) writes

> “[t]hrough the very nature of archaeology’s historical practice, epistemological commitments, and evidentiary terrain, it helped to realize an intrinsically Jewish space, continuously substantiating the land’s own identity and purpose as having been and as *needing to be* the Jewish national home.”

She argues it is now genomics that is the prestige science that holds the most rhetorical power in making historical claims in regards to peoplehood and their shared experience. With advances in genetic sequencing, population genomics has displaced archaeology as the prestige science recruited for nation-building, and for imagining a shared common origin.

It is no longer shards of ancient pots, sunken ships, or scraps of biblical texts, that capture the minds of people with their epistemic power and through material objects make them imagine history as a lived reality. And while today archaeology is becoming financed and promoted by privately-funded NGOs that serve the agenda of the right-wing extremes of Israeli politics, it would seem that genetics that has become the dominant method for defining authentic peoplehood while also gaining higher credibility.

In the case of Qatar, the state and its sponsored scientists do not appear to be constructing an explicitly engineered genetic narrative about the origins of the Qatari people. However, this could nonetheless emerge later on as an unintended consequence, as happened with studies that emerged from the Israeli biobank. In Sidra and the Qatar biobank, we see a tension between the specific medical needs of a population that have resulted from rapid modernization and urbanization (diabetes and obesity in particular), and the general desire for the state to be at the highest level of development in terms of personalized medicine. The unique features of the Qatari Arab population are also alluded to, while likewise emphasizing the mixed origins of the Qatari nation.

Qatar seeks to develop industrially by importing global talent, raising the question as to whether these developments are indeed ‘nation’ building, or merely building industry, without a national character. In any event, the specific development goals of Qatar have been entangled with emerging medical problems. As Qatar has moved from pearls to oil, its population has experienced a rise in diabetes and obesity as a consequence of a change in lifestyle. But a particular vision of population is also produced through the Qatar Biobank, which has assembled samples in an order that recreates a ‘normal’ demographic distribution by foregrounding the role of Qatari men and women with a relative balance in the demographic makeup of the biobank. The biobank, therefore, achieves several things. It creates a material resource of biological samples that can be recruited to draw human capital to Qatar in the form of scientists, clinicians, nurses, and healthcare professionals, which thereby connect Qatar with the global infrastructure. It gives citizens a chance to perform their nationality by giving blood, a potent symbol of life, solidarity, and relatedness. It also allows the imagination of a national population, which complements the emerging culture of Qatari nationalism that it in turn co-produces.

Comparing Biobanks

In these past two chapters, I have found that in the distinct locales of Qatar and Israel, diverse factors, both local and global, influence the basic science at the level of national laboratories and national biobanks. The representative function of the biobank, in terms of its demographic composition, can be read as an ordering device in that it arranges a purposefully elected set of identities. But between Qatar and Israel, I have found distinct mediations of the co-productive relationships of state, biobank, global science, and ethnic genetics. There are significant distinctions between the representative function and character of the two biobanks, and these broad comparisons can be seen in an abbreviated form in table 3. Crucially, the molecularization of ethnicity is arrived at with a different degree of proportionate influence by the state sof Israel and Qatar.

	Israeli Biobank	**Qatar Biobank**
Initial Funding	Israeli Academy of Sciences and Humanities (funded by the State)	Qatar Foundation (funded by the State)
Genetic nature of the population	"an exceptional mix of varied populations from diverse ethnic backgrounds"[119]	"Qatar has probably the most diverse patient population in the world"[120]
Number of samples[121]	1,673 (unrelated)	3,022 (participants)
Current use	Becoming underused	Emerging and imagined to improve the health of the Qatari population
Genomic data available	No	Yes
Future aims	Currently planning a transition to research on personalized/precision medicine	60,000 participants
Social contract	"national repository for human cell lines and DNA samples representing the large variation of Israeli and several Middle Eastern populations"[122]	"a scientific and altruistic partnership between the research community and the people of Qatar"[123]
Biobank goal	Global biobanking	State and capacity building
Regulatory overseer	Tel Aviv University, Institutional Review Board (an academic institution)	Supreme Council of Health (a national ministry)

Table 3. Summary Comparison of Israeli and Qatari Biobanks.

In Qatar, the biobank disproportionately represents the Qatari minority. In this regard, it is a national representative space that excludes the presence of other residents, who in fact constitute the majority of the population. This renders the Qatari identity a

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[119] Gurwitz *et al.* (2003:3).

[120] Sidra 5-Year strategic plan, p.47, accessed online Nov 20 2015, at http://www.sidra.org/wp-content/uploads/2014/12/sidras-five-year-strategic.pdf

[121] as of Nov 29 2015.

[122] Gurwitz *et al.* (2003:5).

[123] Qatar Biobank, general information leaflet, accessed Nov 28 2015, online at http://d1nkk4xtshu10a.cloudfront.net/app/media/436

relational construct at the level of utility. As Comaroff and Comaroff write, "[i]n as much as collective identity always entails some form of communal self-definition, it is invariably founded on a marked opposition between 'ourselves' and 'other/s'; identity, that is, is a *relation* inscribed in culture" (1992:51). Similarly, Dominguez (1989:21), in her ethnography of Jewish identity as an historical "object" in Israel, claims "[t]he existence of 'objects' is always supported, challenged, bolstered, or molded by individuals and groups engaged in social and political processes of everyday discourse and institutional life."

This proposition demands reading ethnic identity as an inherently relational discursive construct. While in the Gulf states the rentier economy prefigures the value of citizenship in relation to migrant workers, in Israel there are distinctions between citizens, who are Arabs, Jews, Christians, Druze, etc. The Israeli biobank, however, has a representative diversity of participants that roughly reflects the demographic character of the state's territory. It includes samples from the ethnic minorities that are not formally represented by the state, which is exclusively Jewish in character.

The Israeli biobank itself does not explicitly emphasize the shared genetic basis of the whole Jewish people or the shared genetic heritage of the different ethnic Jewish groups. However, some studies emerging from samples issued by the biobank have made historical claims about Jewish origins. Nor has the national biobank been part of a state effort to diminish or exclude the indigenous Palestinian/Arab Israeli population. Rather, the Israeli biobank was founded with the intention of serving a humanistic project of furthering biomedical knowledge of the global diversity of the human species. In Qatar, however, a new identity is being forged as the biobank is co-produced with a strong

Qatari national identity.

Indeed, the Qatari biobank and Sidra have stated intentions to uncover the genetic structure of the Qatari people, though it is unclear if this research will emphasize a historical presence in Qatar, justifying the sovereign rights of the state, or indeed if this ‘structure’ will emphasize the diverse origins of the population shared with other Indian Ocean and Persian Gulf nations.

The Israeli national biobank does not receive direct funding from the state; it survives on individual grants that must be renewed, and the future of the biobank is uncertain. In Qatar, the biobank is in its early phase but has plans to grow significantly in the coming years, with generous funding from Qatar Foundation, which is endowed by the Emir. In this regard, the missions of the biobank and Sidra are the indirect implementation of the vision of the Emir and his close family members. These biomedical developments are generating great activity and draw professional migrant workers from across the world. One reason for the interest and support that the Qatar biobank has engendered is its goal to be a top-level player in the global move towards personalized medicine, which requires complex personal, medical, and genetic information about large numbers of people. This fact ties the excitement about Sidra and Qatar to the global market rush in healthcare towards personalized therapeutic and diagnostic technologies.

The Israeli biobank, however, without genetic data, or sophisticated biomedical information, is becoming less used in this current move towards big data analytics that foregrounds the search for biomarkers for precision therapies. The Israel biobank must also be understood in the context of a state that has generally moved to the political right in the past thirty years with the recession of the state from major public development, and which has been characterized by the emergence of a ‘start-up nation’ culture characterized by the large numbers of entrepreneurs and successful innovative ventures it has produced (Senor and Singer 2009). Senor and Singer (2009:i) ask the “trillion-dollar question” of

> “[h]ow is it that Israel—a country of 7.1 million people, only sixty years old, surrounded by enemies, in a constant state of war since its foundation, with no natural resources—produces more start-up companies than large, peaceful, and stable nations like Japan, China, Korea, Canada, and the United Kingdom?”

They argue against the reductionist and racially deterministic rationale that Jews are simply smart, but rather address the sociological factors that have conditioned the fabric of Israeli society and incubated this culture of entrepreneurship. They attribute Israel’s success in producing entrepreneurs to several things: one is the loose hierarchical structure that Israelis learn in their mandatory military service. Israelis typically challenge authority and are rewarded for questioning authority if their objections are justified. Another is the high degree of technical training that is included in the special programs that the military provides. Moreover, the experience of military service leaves Israelis with a close network of friends and colleagues with whom ventures are typically launched.

They claim “the IDF’s improvisational and antihierarchical culture follows Israelis into their start-ups and has shaped Israel’s economy” (2009:177). They also identify Zionism as an important imaginary in keeping Israelis motivated in helping build their nation. In comparison, they note the absence of a similar motive in the Gulf states of the Gulf Cooperation Council (GCC). They note that in Dubai “most of the entrepreneurs that come from elsewhere are motivated by profit—which is important—but they are not also motivated by building the fabric of community in Dubai" (2009:205).

It would seem that a state's leading role in nurturing biomedical development, as seen in Qatar, is absent in Israel, where it is perhaps private industry, and entrepreneurship, that drive research and development and supplant the role of resources like the national biobank in driving biomedical advances. In this reading, a strong national identity and mode of citizen identification with a nation-building project are necessary for prosperous growth.

In Qatar, there is a clear vision of capacity building and attention to the citizen population's particular health needs. These developments are emerging directly from the epicenter of state power, through Qatar Foundation, and embodied by Sidra and the Qatar national biobank. In Israel, by distinction, the national biobank exists and ensures its continuity in precarious circumstances, with no certainty, and with no mandate invested in it by the state. Nor is it guaranteed future support. Nonetheless, both biobanks and the associated research endeavors they engender succeed to inculcate a vision of peoplehood, national coherence, and biomedical progress, which serve to foster an imagination of national community, meliorism, and a utopian future at the level of individual bodies and state economics.

Concluding Words

Global science takes on national characteristics in its specific, grounded locales. However, a close examination of the laboratory practices, genome projects, and biobanks in Israel and Qatar necessarily leads to the conclusion that there is no unequivocal genetic marker or signature that is a *sine qua non* of Arab Qatari or Jewish Israeli identity. No Jewish genes, nor Qatari genes. A national context does not entail a national gene. In fact, an internalist analysis, or immanent critique, of the scientific discourses suggests that it is precisely the genetic diversity of these populations that renders them interesting and valuable for medical research.

It was therefore surprising to me that during the writing of these conclusions that Kuwait announced that it would become the first country to demand a DNA sample of every citizen be assembled in a database. To be a Kuwaiti citizen, "[a]ccording to the Kuwaiti constitution, citizens must be able to prove that they or their forebears have lived in Kuwait since 1920."[124] If this is law were strictly applied, "about 10% of the Kuwaiti population are not citizens."[125] Despite the fact that there is no legitimate scientific basis for 'identifying' in the philosophical sense of the word (i.e., equating ethnic concept with substance) a national essence legible in DNA, genetic tests may still be deployed to determine biological connections, and those biologized kin relationships may become the basis for determining ties that achieve national belonging and rights to citizenship. Or, at least, the imagination of genetics' 'truth-power' has infiltrated the discourse of state biopolitics and border control. In turn, this kind of biopolitical discourse only strengthens the metaphorical potential of 'DNA' as the bearer of an essential ethnic identity.

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[124] Cook, M. (2016) Kuwait becomes first country to demand universal DNA tests. *BioEdge* Aug 27, accessed Mar 1 2018, at https://www.bioedge.org/bioethics/kuwait-becomes-first-country-to-demand-universal-dna-tests/11974#disqus_thread

[125] See Cook, M. (2016), above.

These findings raise a contradiction: despite the science falling short of unequivocally authenticating the bio-nation, the imagination of genetic peoplehood persists and circulates, even at the level of the state. The social life of genetics exceeds its epistemic bounds in the affirmation of norms.

How often does one hear the phrase “it’s in our DNA” these days? Though this circulation of genetics as a metaphor for inclusion is very real, the scientific potential falls short. It is, of course, the primordial relations of inclusion/exclusion that charge the genetic metaphor with its rhetorical power. This relationship of genetic imaginaries and national inclusion/exclusion can be understood as the co-production (Jasanoff 2004) of a national imaginary and a genetic discourse. This is not to say that the nation is less real than the science, or *vice versa*. Rather, the nation as a lived reality is concretized in institutions of power and governance, while the bio-nation as genetic cohort becomes the ‘metaphysical add-on’ that only achieves credibility within the conditions of state power that can back up the fiction of peoplehood with truthful violence. Such a ‘genetics of belonging’ can perhaps only be imagined in a context of belonging.

Earlier in this dissertation, I proposed that the process upon which the discourse of the molecularization of ethnicity depends involves a double reification. That is, it depends on an assumption of unity between the concept of genetic signatures and the material reality of the ethnos, and that there exists a necessary reading frame, the felicity conditions of which are the doxic assumptions of the prior existence of an ethnos, i.e., a people that exists with some shared characteristics and a belief in their sharedness. However, the findings that I have discussed in this research demand a reconsideration of this proposition that a ‘double reification’ would be an erroneous misrecognition of an existing ethnic essence that can be determined and legitimately read at the level of DNA.

Genetic peoplehood is more than a misuse of science. Genetic peoplehood is a genre of imagining belonging. Let us put into suspension momentarily the meta-epistemological stance that would condemn the whole discursive arena of ethnic genetics to the realm of ideology and false consciousness. Instead, let us consider the precise mode of existence that ethnic genetics depends upon. Or, more exactly, to ask what ontological register the concept of ethnic genetics depends upon to come into existence. More precisely yet, the ontological foundation of ethnic genetics must be understood on its own terms, within the structure of its conceptual principles. In the most plain of language, the question remains, how is it that ethnic genetics has such a powerful circulatory potential – e.g., in law, the popular imagination, and in battles over historical presence – when at the level of molecular genetics there is unequivocally deemed to be no ‘ethnic gene’?

The philosophical anthropologist Philippe Descola (2013) recently published an essay in which he engages in a comparative study of the multifarious ways in which entities come into identifiable existence. He calls these distinctions “modes of identification,” and they can be separated into four models, that act as heuristic devices for separating entities that would ordinarily appear incommensurable. These models are ideal types. They are not supposed to represent the complex ways in which entities are understood or woven into daily practice. They are simply guides for comparing and analyzing the philosophical basis that underpins existence and mode of recognition in a cross-cultural context. The four ‘ontologies’ that Descola proposes are an extension of the longstanding anthropological concepts, *animism, totemism, naturalism,* and *analogism*. The effort serves to consolidate the insights that the ethnographies of both modern and native societies have yielded over the past half a century or so, and to formulate a way of thinking comparatively in a way that does justice to the diversity of ways in which humans establish social order and live in the world.

Naturalism denotes the dominant ontological scheme of modern secular societies, in which the evident physicality of what exists typically takes precedence over any invisible internal properties of things. This distinction between internality and physical externality is a continuation of Cartesian dualism that punctuates the mind/body dyad, and which is replicated in the soul/body distinction, and nature/culture binary. Naturalism is thus the common sense of modern rationality, of secular societies, and of science.

Animism, secondly, is the ontological scheme that accords with the proposition that what are typically deemed objects of 'nature' (e.g., the sun, moon, plants, mountains, or rocks) may have internal vitalisms comparable with human interiority. Animistic beliefs are thus impugned as primitive and unreasonable in scientific communities.

Totemism, thirdly, as has been well cataloged in the ethnographic literature, is the mode of identification that typically denotes a relationship of equivalence, or identity, between a non-human entity and a human collective. An everyday example would be a team mascot that stands for the social collective and as such cannot be violated without implying an attack on the collective.

The last ontology, analogism, is a synecdochic mode of identification that comprises heterogeneous elements and transcends scales, examples of which include horoscopes or traditional medical healing techniques that mobilize symbols for therapeutic efficacy. Analogism, in short, is a mode of identification that presumes a physical discontinuity, but a continuity of interiority between the objects in a relationship of identity.

Thinking across these ontological registers may be helpful in addressing the contradiction between the patent absence of an ethnic gene and the proliferation of gene talk, including the potential use of genetics as a regulatory technique of the state. For this discussion about the materiality/immateriality, and indeed the associated implications, of ethnic genetics, one might assume that the correct mode of identification for genetics, being a science, would be naturalism. In the naturalist ontology, a genetic marker for ethnicity would need to be physically evident by some means according to the normative epistemological standards of the science. However, even though there is indeed no unequivocal evidence of a 'Jewish gene,' or 'Qatari gene,' the discourse of genetic identity still holds weight and achieves a certain amount of worlding. This is the basis for genetic research of national populations, and for the mythic circulation of 'gene talk.' Even though the ethnic gene does not exist by the internal naturalistic standards of genetics, it nonetheless exists or can be better identified or apprehended, in another ontological register.

Certainly, through the channels of discourse that it enables, ethnic genetics serves to stabilize the imagination of the ethnos. Or at least it may be mediated in a modality comparable with the standards of one or more of the ideal types that Descola has described. Even while not achieving the standards requisite for existence in a naturalist ontology, ethnic genetics still functions as popular discourse, a way of believing and imagining, and as such it may still impact modes of managing national populations. It reiterates the ontic essence of the nation. It is also a way of measuring belonging (elective or imposed) of citizens.

In an obvious sense, the gene talk emerging from ethnic genetics is patently bad science. But by the ideal standards of the analogist ontology, or read as semiosis, for example, the discourse can perhaps be understood in more precise detail.

Even while no material connectivity can be measured in genetics that could establish an externalized continuity between all the Jews or between all the Qataris, the imagination of some interior continuity is both assumed and propagated through the genetics of ethnic populations. The molecularization of ethnicity does not gain its epistemic power convincingly in a pure naturalist ontology. It is not patently evidenced. There it fails. Rather, the discourse of ethnic identity takes a hybrid form in the language of genetics, in which a relationship of collectivity is presupposed. This is the precondition, I argue, for why genetic identity persists and circulates, even while it fails fulfillment within a naturalist ontology.

The imagination of genetic relatedness is not a mediation of scientific facts; it is the dissemination of an identity that is the structuring frame within which the genetics research is conducted. This finding, the fact that the molecularization of ethnicity takes form in a hybrid mode of identification, has significance for the social study of science and especially for the study of identity. It demonstrates that in this era of the molecularization of identity, with the rapid proliferation of self-directed recreational genetic testing, identification is not sequestered and negotiated solely in a naturalist ontology. Even when identity cannot be verified in the natural sciences, the imagination that has propelled the effort succeeds to propagate. For this reason, one cannot adequately critique ethnic genetics without inadvertently critiquing the foundations of the imagination of an ethnos.

Ethnic genetics cannot be separated from nationalism. Consequently, genetic identity cannot be negated with the language of genetics. This would be a misunderstanding of the phenomenon. Rather, its ontological scheme is hybrid, both naturalist, and analogist. It imports imaginaries that are not guaranteed by the science. This analogist mode of identification is constituted outside of a material, naturalist, mode of identification. This proposition conforms with the insights furnished by the social study of science, which have demonstrated that science's epistemic outputs are never fully 'purified' from their politicized context of production (Latour 1993). It is merely the modern conceit, or meta-narrative, that nature and culture are 'naturally' separate domains. Hence, the nation can neither be proved nor disproved by genetics.

But each case of purification is unique. My journeying in the Middle East has shown how biobanking and genetics research relate to the ethnonational context, and to their populations in varying but comparable ways. First, the molecular realm is clearly an emergent site for articulations of ethnonational identity in the contemporary Middle East in a multitude of ways: in national genome projects, biobanks, precision medicine research, legal discourse over citizenship, historical debates that recruit genetics as evidence, and in the performance of biological citizenship.

These processes are entangled to varying degrees with popular understandings of emerging nationalisms, public health initiatives, and national development plans. They are not simply grassroots initiatives with individuals staking a claim to their national origins with recreational DNA tests. National biobanks are an instrument in facilitating the basic scientific research of ethnic populations and in fostering the practice of performing national inclusion through the donation of biological samples. But this research is comparative, and perhaps the most revealing comparison is the direct juxtaposition of the Israeli and Qatari national biobanks. Despite the distinctions between the ethnonational context of the states and their unique cultures of global modernity, a closer look at the epistemic outputs of the genetics research is revealing.

Both the Israeli and Qatari national biobanks make claims to being 'exceptional' by virtue of the unique genetic composition of their populations. These claims, however, are not based on a high degree of homogenous similarity, a unique purity, or by a high degree of relatedness, but rather on the complex genetic diversity that characterizes both the Israeli and the Qatari populations. These claims demand recognition of the relationship between the utility of these claims and the society that has produced them. Utility, in the basic genetic research of populations, is somewhat proportionate to the diversity of the populations, particularly in the genomic study of inheritable disease.

Despite this general principle – that genetic diversity holds more scientific utility – the Israeli state must be understood in its historical context if one is to comprehend the role of ethnic genetics in this diverse society. From the early years of the Israeli state, Jewish nation-building had faced several challenges, such as the integration of Jewish immigrants from diverse backgrounds, the inclusion of indigenous Arab populations, and the balancing of power between secular and religious groups. These issues were tackled through strategies of immigration policy, like Israel's Law of Return, the development of a national language in modern Hebrew, and the establishment of a 'civil religion,' with Jewish national holidays and monuments. But more recently Israel has received many non-Jewish immigrants, which has raised suspicions over who is a ‘real Jew.’ Divisions between Orthodox and secular Jews have also increased, and Israel has moved away from its socialist beginnings to become a more unequal, market-driven society so that the divide between the political ‘Right’ and ‘Left’ now primarily distinguishes supporters of territorial expansion from those who favour return to the pre-1967 borders and support the establishment of a Palestinian state. Within this fraught context, the “‘biologization’ of Jewish culture and historical narrative” (Egorova 2014:354) affords the possibility of imagining continuity, solidarity, and collectivity, where sociological divides could otherwise be emphasized to the detriment of national cohesiveness.

A comparable mode of unification is at play in Qatar, where tribal familial identity is giving way to an emergent national identity, at least at the formal level of state symbols and public culture, most effectively exemplified by National Day, the Msheireb museum complex, the national biobank, and the national genome project. This is not to say that old alliances and family “bloodlines” have eroded (Fromherz 2012:113). Rather, Qatar now enjoys peaceful neo-traditionalism, coupling tribal traditions and modern lifestyles. This historical movement has carried with it an imagination of national collectivity that is taking powerful symbolic form in national biomedical developments.

Both the Qatari and Israeli instantiations of ethnic genetics and biological peoplehood demand recognition of the relationships between basic science and the national context, with a specific focus on the role of state institutions in driving these efforts. The phenomenon can be thought of as ‘the molecularization of identity,’ which I gloss as *the privileging of the molecular realm as a site for authoritative articulations of ethnonational identity and belonging*. The broader national context thus becomes *reified* content in the biosciences. The national context is reified in the sense that the nation as metaphysical imaginary takes concrete form in the misrecognized relations between the citizenry and its supplement, the excluded, in the imagination of genetic identity.

This process is significant for the anthropology of science, the anthropology of identity and belonging, and for STS, as it addresses ethnic and national identity as they are constituted through biological technologies. This process speaks to the relationship between scientific knowledge and political power, and specifically work by Jasanoff and colleagues (2004:i), which yielded the idiom of "co-production" to emphasize how "scientific knowledge both embeds and is embedded in social identities, institutions, representations and discourses."

Co-production, as an analytic reading device of the molecularization of identity, assumes that "the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it" (Jasanoff 2004:2). This way of conceiving the political entanglements of science shows how science achieves purposive political work when we consider that the materializations of ethnic genetics, and the application of the associated scientific knowledge, are both constitutive of social life and at the same time are realized in – and indeed dialectically realize – political fields.

Ethnic genetics, in a co-production reading, is embedded "in social practices, identities, norms, conventions, discourses, instruments and institutions" (Jasanoff 2004:3). But co-production, as an ethics of reading ethnic genetics in society, is also, therefore, "a critique of the realist ideology that persistently separates the domains of nature, facts, objectivity, reason and policy from those of culture, values, subjectivity, emotion and politics" (Jasanoff 2004:3). For this work, ethnic genetics ought to be read as being co-produced with a national identity. The idiom of co-production foregrounds "ontological politics" (Mol 1999) over the epistemological purity of the claims. It does not regard claims outside of a sphere of their selective election. In this regard, it also accords with the Frankfurt School theorists reviewed in the introduction and assumes that ethnic genetics, as a scientific object, has a political *a priori* embedded in it. But each case has its particularities, and the identity is never guaranteed.

Here we see two nationalisms at different moments in their development, but with both coupled to genetics in complex ways. Israel has moved from its secular socialist beginnings in the early 20th-century to a more globalized, commercialized, and divided society, with Ram's (2008) characterization of 'McWorld and Jihad' (that is, globalized modernity versus its negation, local religious nationalism) becoming more pronounced. The contradiction between these cultural poles is apparent, for example, in the news media focus over the past months, oscillating from the forced deportation of African refugees to the latest start-up conferences and technical innovations emerging from Israel. Israel's character stands in tension between its dubious image as a human rights violator and its preeminence as a global innovation superstar.

The Israeli national biobank may be understood within this pole of contradiction. The biobank represents the ambition of secular cosmopolitan Israel to be part of global modernity, and its work facilitates the 'McWorld' integration and collaboration that is necessary to be at the forefront of biomedical research and innovation. The biobank stands for unmarked global modernity and secular technoscientific progress. It is within the other pole of the Israeli cultural spectrum that one finds right-wingers appropriating genetics as a way of imagining the tribal particularity of Jews, as a way of proving the occupation is legitimate, of authenticating the *ethnos* as a natural fact, and of defending Zionism as a return. It is across this political spectrum that the natural facts of genetics research discursively migrate and transform into the mythologized ethnonationalism of the bio-nation. However, Israel has also moved towards a market-based society, and as the majority of the biomedical research is moving to private biotech companies, the Israeli biobank is becoming underused and outmoded. The epistemics of Jewish genetics fall short of its mythic circulatory semiotics. This is the ultimate lesson from my ethnographic work in Israel.

What is happening in Qatar is quite different. Qatar is in the early stages of its nationalism, and the modality of statecraft is distinct. Unlike Israel, Qatar is an ultra-rich monarchy endowed with an Islamic character. The Qatari state is massively investing in biomedical development as part of the national plan to enskill the Qatari citizens and include them in the high-tech economy (*Qatarization*). These development goals aim to make Qatar an equal partner with other developed states in global biomedical research. In terms of the circulation of genetic national myths, Qatar is also different from Israel. It is the state that is massively driving the genetic research of the Qatari people that is selectively assembling Qataris for genomic analysis.

Nationalism in Qatar, however, is not part of the negation of a secular global modernity driven by the state. It is a state-driven program of legitimization of the monarchy. It is a way of building the Qatari national identity and driving technological development in concert. But the genome project and biobank themselves need Islamic legitimization, particularly at the level of medical ethics, and this is a line of study that should be pursued further with a careful look at the way in which precision medicine gains an Islamic character in Qatar. However, there is not yet a widely circulating discourse of genetic nationalism in Qatar. I have not seen or heard debates about Qatari origins, nor has the state announced the use of genetics in determining citizenship. Perhaps the mythology of Qatari nationalism is amply filled by the state's efforts, with National Day, omnipresent flags, and a media image campaign carefully monitored by the state.

It appears the Qatari national imaginary is bolstered by the genetics research of the Qatari people. The Qatari national imaginary is a structuring precondition of this relationship. The Qatari context does not square so well with Ram's (2008) dialectical formulation of secular globalism versus local tribalism. Rather, Qatar seems to be comfortably on the course towards global tribalism. Indeed, the Qatari state is ethnonational but with ambitions to be part of globalized modernity without negating its religious or ethnic character. The contradictions of 'McWorld and Jihad' do not obtain in the same way in Qatar, where traditionalism and modernity sit alongside each other peacefully, in what Fromherz (2012:113) calls "neo-traditionalism," a blending of tribal traditions with a modern lifestyle, technology, and urbanization.

What do these findings on the role of biobanks and genome projects in establishing, mediating, and reinforcing ethnic and national identities say about the contemporary moment in Middle Eastern nationalisms? We know from Anderson's (1983) canonical analysis of the mediation of national identity in South East Asia that newsprint media inculcates a shared imagination of citizens as co-present members of an imagined nation-state. Further, as mentioned in the introduction, work by Appadurai

(1990) extended this reading to think multidimensionally about the diverse regimes of cultural mediation in a delocalized, globalized, but interconnected, world. The Middle Eastern ethnonationalisms I have tracked here, however, gain a particular footing in the biosciences. This is my principal finding. Genetics becomes a regime of mediation of the bio-nation. In Israel and Qatar, it is the confluence of state development goals, global scientific ambitions, internal demographic anxieties, and specific citizen medical needs that in concert render the 'bio-nation' an object to be apprehended in the biomedical sciences. In such an assemblage as the 'bio-nation,' the citizen is apprehended as a therapeutic subject (as in the Qatar biobank) or is imagined as a 'natural' genetic constituent of the bio-collective, as in popular discourses of genetic belonging and citizenship in Israel.

While this phenomenon of the bio-nation I am glossing here is indeed overdetermined by a myriad of factors, analytically we can say it is fundamentally the entanglement of the technical, the political, and the epistemic, that gives rise to the possibility of apprehending the nation as a natural biological entity. Perhaps this is the modality of nationalism we will see more of in the Middle East in the 21st-century. The national collective can be apprehended, treated, and managed as a biological object. The national imaginary begets – is co-produced with – a national object in the form of the bio-nation. This may mark a new moment in the history of Middle Eastern nationalisms, and beyond.

These findings confirm the interpretive capacity of the idiom of co-production in comparative social studies of science, which will be instructive for further studies investigating the issue of the complex relation of local scientific objects and the global context of their emergence. This work also emphasizes the intellectual value of comparative work in the anthropological study of science. In juxtaposing the particular biopolitics of Qatar and Israel, this work has brought to light the distinct ways that global scientific trends may be indigenized and incorporated into varying ethnonational imaginaries and the entailed political projects of inclusion and exclusion. In both states, we see the genome mediate the imagination of citizenship and fostering hopes of healthy and prosperous futures.

Here, science is part of building states that are networked into the global economy of knowledge production towards the imagined goal of a new era of precision medicine even while such universal mobile science reinforces the mythical ethnic identities that are the precondition of the ethnonation that makes this movement itself possible. Science, curiously, can both dispel and reiterate the mythological.

Appendix 1. Map of Israel

Map No. 3584 Rev. 2 UNITED NATIONS
January 2004

Department of Peacekeeping Operations
Cartographic Section

Map of Israel. United Nations, accessed Nov 22 2015, online http://www.un.org/Depts/Cartographic/map/profile/israel.pdf

Appendix 2. Map of Qatar

Map No. 3867 Rev. 3 UNITED NATIONS
January 2004

Department of Peacekeeping Operations
Cartographic Section

Map of Qatar. United Nations, accessed Nov 22 2015, online at http://www.un.org/Depts/Cartographic/map/profile/qatar.pdf

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