



MEXICAN GENOMICS AND THE ROOTS OF RACIAL THINKING

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Cultural anthropologists' work on race in the United States largely remains predicated on a strict delineation of the social and the biological as two distinct domains. The social constructionist stance on race is principally informed by a concern with assailing ideological notions that racial identities are both legible in and fixed by our biology. But with the increasing attention to "biosocial" dynamics, both within and outside of anthropology, it is questionable how long a social constructivist view of race will remain tenable. Whether in terms of the "traffic in nature and culture" (Franklin 2000) or the "biocultural synthesis" (Goodman 1998), a significant trend of research and theorizing in anthropology now leads in the opposite direction of the principal orientation of critical work on race in the United States, with its rigorous concern with policing the line between society and biology.¹ Genomic research is a prime example of this tension (Hartigan 2008). On one hand, it has drawn intensive attention from cultural anthropologists who work on race in the United States and who are keenly alert to the possibilities that claims made about human variation in the wake of the Human Genome Project will reprise or reanimate eugenical thought about racial identity from the previous century.² On the other, genomics projects are heralded as initiating the end of "raciology" (Gilroy 2002) and presenting a range of concrete examples of how fundamental typological assumptions about racial, as well as human, identity are being overturned (Rose 2007). Simply put, then, the question arises of whether cultural anthropologists' approaches to race are sufficient to the task of discerning

and explaining the possible racial dimensions of recent genomics research. Or, perhaps, are genetic projects, as terrains of imagining and engaging biosocial forms of identity, challenging some of the basic assumptions that have guided critical work on race in the United States for several decades?

This article examines these questions and possibilities via a comparative ethnographic perspective on two genomics institutes in Mexico. I began fieldwork in Mexico in the summer of 2008, solidly convinced that I knew what race looks like when it appears in or informs genetic research. This confidence was such that I did not quite seriously imagine different national contexts would fundamentally alter or challenge my understanding of race. Guided by the notion of “global race” (da Silva 2007), I anticipated finding the fundamental dynamics of racial thinking at work in a project that aimed to sequence or map “the Mexican genome.”³ This essay relates how, in the course of my ethnographic queries, I came to recognize not just the particular textures of nationalism shaping the potential relevance of race in genomics research, but also how I was confronted by *uses of race on nonhumans*. While initially surprising to me, I have gradually realized that nonhuman domains and entities are crucial to understanding racial thinking. But the possibilities of fully grasping the great breadth and depth of racial thinking via an attention to its application on nonhuman species require reformulating cultural anthropologists’ insistence on maintaining a bulwark between culture and biology.

Basically, this stance on culture and biology is oriented to guard against forms of naturalization or biologization of social categories or identities linked to race.⁴ The long history of scientific racism and dehumanization underscores the importance of this watchfulness.⁵ But my key finding is that the inexorable intermingling of culture and biology is not strictly encompassed by such ideological uses or interests. The core political concern at stake here is that nature and biology become bases for fixing racial identities. But the view of genomics I offer below suggests, instead, that there is very little fixed about genomes, and that they as easily provide a basis for characterizing identities as fluid and plastic—characteristics that are typically emphasized by cultural anthropologists.⁶ This finding fits well with emerging work on race, in particular that of Peter Wade, who observes that an appeal to nature in relation to racial identity “does not automatically involve a simple idea of permanence: human nature and human essences may be seen as changeable” (2002:15). Wade’s point has bearing, too, on uses of race in relation to nonhumans, as I will illustrate here with the case of *razas de maíz* or races of corn in Mexico. Expanding upon Wade’s efforts to recalibrate our understanding of processes of naturalization, I additionally find that the “traffic in nature and

culture” around race and nonhuman entities is not singularly reducible to forms of dehumanization.⁷ In the notion of races of corn, instead, we can glimpse multifaceted efforts to think speculatively about parallels between people and plants and animals, rather than to dehumanize a social group through such associations.⁸ Taken in concert, then, the snapshots I offer here of Mexican genomics suggest the need to expand and revise the suppositions informing racial analysis in the United States today.⁹

Of the two national genomics projects that are the focus of this article, one seeks to establish a “Map of the Mexican Genome,”¹⁰ that is, of humans; the other is concerned with a variety of plants considered to represent the national patrimony: maize, beans, and avocados. I began this ethnographic project at Instituto Nacional de Medicina Genómica (INMEGEN) in Mexico City, in the summer of 2008, because I suspected that this undertaking mirrored research in the United States that was at the center of intensifying debates about the reality of race. But I shifted to additionally include Laboratorio Nacional de Genómica para la Biodiversidad, (LANGEBIO) in Irapuato in September 2010, because I became intrigued by their work on razas de maíz. These paired sites allow me to pursue a nuanced examination of distinct “styles of genomic thought” (Rose 2007), both within Mexico and in contrast to research in the United States. The project at INMEGEN initially caught my attention because it was trumpeted in the U.S. business press as a “race-based project.” Veronica Guerro Mothelet and Stephan Herrera (2005) reported that “Mexico has launched a race-based genome project to determine if a genetic basis exists for its growing health crisis. The goal is to glean insights into genetic difference, believed to be unique to its population, that may play a key role in chronic diseases like asthma, diabetes, and hypertension.” The Institute’s Director, Gerardo Jiménez-Sánchez, underscored the project’s targeting of a “unique population.” “Characterizing genetic variation in our unique population,” Jiménez said, “is the only way to cost-effectively develop better strategies for preventing, diagnosing, and treating such diseases.”¹¹ He accompanied this assertion of Mexicans’ genetic uniqueness with the oft-stated aim of doing so only to arrive at individualized forms of genetic medicine—a stance commonly asserted by geneticists in the United States who are criticized for using racial categories to label populations.

At first glance, the use of race in framing and orienting this genetics research project seemed obvious. Not only was this possible genetic distinctiveness of Mexicans being construed following a racial formula, the project’s imagined goals and findings were directed towards diseases that are associated with racial health inequalities in the United States.¹² But over the course of fieldwork stints during

the summers of 2008 and 2009, this assessment seemed increasingly problematic. Partly because of geneticists' at INMEGEN insistence that their project did not involve race, but also because the ways they modeled and analyzed their data were antithetical to approaches in the United States that ethnographers have identified as racial. As I interviewed these researchers, I was confronted by a disjuncture between such succinct, summary judgments coming from the United States and a steadfast, adamant insistence by these Mexican geneticists that they were not engaged in racial analysis and that their project was not "about race." In contrast to the United States, where such mapping projects tend to be explicitly informed by racial thinking (via U.S. Census categories or data) or, at times, energetically seek to make claims about the genetic basis of racial identity, these Mexican researchers' disavowal of such a connection, making a principled case against using race, seemed rather striking. Their counterpoints to my queries about racial aspects of data collection or analysis were often informed by a sharp sense of the racialized character of research in the United States (Epstein 2007; Montoya 2011). Eventually, I began to consider that the "race-based" characterization in the United States was more a reflection of a view that identifies "Mexican" principally as a racial category, rather than an accurate assessment of the genomics research at INMEGEN. But before exploring this thought process further, I will provide a fuller picture of this institute.

INMEGEN is an outgrowth of the Mexican government's efforts to improve the country's competitiveness in areas of science and technology. Established in 2004 as one of 12 national institutes of health in Mexico, INMEGEN's mission is largely framed in terms of contributing to the healthcare of Mexicans, generally. But it is also construed as "a cornerstone of the Mexican strategy to develop a national platform in genomic medicine" (Jimenez-Sanchez et al. 2008). The initial goal of INMEGEN was to establish a haplotype map of the Mexican population. The reasons behind this objective are varied, but the central expressed rationale is that the International HapMap Project did not include any populations from Latin America.¹³ Designed to catalog common genetic variants that occur in humans, the International HapMap targeted African, Asian, and European ancestry, drawing samples from Nigeria, Japan, China, and the United States. Geneticists with INMEGEN argued that, if the country was to attract the interest and investments of global pharmaceutical companies, as well as to pursue genetic research in terms of the nation at large, Mexico needed to produce a haplotype map of its own.

INMEGEN's subsequent effort unfolded in stages, with the initial one designed to take blood samples from 300 nonrelated, self-identified "mestizo" individuals

from the states of Sonora and Zacatecas in the north, Yucatán in the southeast, Guanajuato in the center, Veracruz along the Gulf of Mexico, and Guerrero along the Pacific. They analyzed these samples via a 100k Affymetrix chip, measuring heterozygosity, performing principal component analysis and calculating F_{st} statistics. As one of the senior researchers, Dr. Santiago March Mifsut, explained to me, “the first question was, are we the same? Do we have the same genetic profile in different states in Mexico? And then, what do we have in common and how do we differ in genetic profile with the HapMap populations?” My first question, of course, was: in what way is this genomic project racial? In attempting to answer, I first discerned a certain dissonance with what I had learned to listen for in genetic discourse on race in the United States, which is commonly formulated in terms of making claims principally about African Americans or Hispanics (Graves 2005). Genetics projects in the United States rarely seem to feature such questions about national sameness in regards to race. Still, I recognized that the very gesture of positing a “unique population” suggests a basis for seeing race at work here.

Sandra Soo-Jin Lee, in tracking national genome projects globally, focuses her attention on “the emergence of the trope of ‘genetic particularity’ that insists on a framework of race whereby meaningful biological differences lie waiting to be ‘read’ from individual genetic codes” (2006:445). Lee finds this trope actively at work in exactly the type of national genome project pursued by INMEGEN. Examining the creation of biobanks in Iceland, South Korea, and the United States, Lee asserts that “DNA repositories maintain both physical and symbolic spaces for notions of genetic essence among human groups whereby ‘race,’ framed as a natural kind, forces further consideration of the production of human identity through the assemblages and classification of human genetic materials into national biobanks” (445). In this analysis, the principal characteristics of racial operations linked to genetics, which hinge on assumptions about biological difference linked to notions of “natural kind,” are truly global in scope.

A counterpoint, though, to Lee’s view is that national contexts may complicate this equation, particularly in countries where the ideology of a biological basis for race is either formulated rather differently or perhaps largely absent.¹⁴ Nikolas Rose articulates this stance in his vigorous effort to counter claims that biotechnology will inevitably reproduce eugenical thinking and practices (2007). Rose promotes an analytical shift away from reading “race” in global terms, in order to attend to the specific dynamics of national contexts in which such research is generated and consumed. Karen-Sue Taussig, in her ethnography of genetics research centers in the Netherlands (2009), finds that, “in this context, entering the global arena of

biotechnology markets is, ironically, conditioned upon assertions of distinctly local national genomic identities” (193). In this view, the fact that a national genome project is construed in terms of a “unique population,” does not necessarily imply that it is a racial project, since such claims are the standard of admittance to the global domains of genomics.

Further reasons for being circumspect about designating such projects as racial are found in the ethnographic work of Wen-Ching Sung in China and Jennifer Liu in Taiwan. In examining genomic research in China, Sung regards the trope of genetic particularity somewhat differently than does Lee and argues that concepts of “Chinese DNA,” for both researchers and laypeople generally, do not reflect a racial logic. Specifically, Sung argues this point based on the contrasts she finds with Western racial discourse. Sung writes, “traditional racist rhetoric emphasizes the ‘purity’ of blood, the supremacy of a race over others, the fear of ‘racial degradation,’ the biological foundation for different peoples distinct intellect, behaviors, and lifestyles, and hence the legitimacy of apartheid measures of one kind or another. It is an *exclusive* rhetoric.” In contrast, “the notion of Chinese DNA stresses more the uniformity and homogeneity of different ethnicities across and sometimes even outside the country,” and hence “is an *inclusive* rhetoric.” Similarly, Liu, examining stem cell research and its circulation in the Taiwanese public sphere, argues that this nation is not “follow[ing] a 20th century European course of nation building . . . or racism,” and that “the construction of a Taiwanese identity as genetically hybrid would seem to foreclose the possibility of a purity-based racial politics.” Neither ethnographer finds that genetics research on these “unique populations” lead to racial claims linked to biology or purity.

All of this leads me to be circumspect about characterizing the “Mexican Genome Project” at INMEGEN as a “race-based” project. Too, as noted above, I was met with a confident insistence that the Hap Map project at INMEGEN was not, as we would say in the United States, “about race.” This point was driven home for me by César Lara Álvarez, coordinator for the Centro de Estudios Éticos, Legales y Sociales—or “ELSI,” as the geneticists at INMEGEN commonly refer to it in conversations, drawing on the English acronym for Ethical, Legal, and Social Issues—a stock, institutional component of human genomics research. The potential for race to matter, in Lara’s account, lay with the inclusion of indigenous groups in the project in subsequent phases of population sampling. Lara stressed to me that, when dealing with indigenous peoples, the priority is “to not discriminate, to do things properly, to conform with the law and international regulations, with

a translator present, giving them every guarantee of being totally transparent and objective so that those who want to participate can participate and those who do not want to do not participate.” Lara underscored this point by drawing a contrast with “countries where there had been abuses,” such as in the United States, specifically referencing the Tuskegee syphilis experiment.¹⁵ He largely argued that if there were legal guidelines and strict procedures in place, then “racial” would not be a factor.

With the reference to Tuskegee and the history of racialized medical practices in the United States, I confronted yet another instance in an ongoing public and scholarly dialogue about the contrasting history and perceptions of race in these two countries.¹⁶ Arguably, INMEGEN’s emphasis on sampling “the mestizo population” certainly did imply the role of racial thinking, since it seems to biologize key tenets of “mestizo nationalism.”¹⁷ Even so, as I listened to Lara and others describe their work at INMEGEN, the more striking feature that I came to recognize is how sharply such possible uses of race linked to “mestizo” identity contrast with views of race held by many geneticists in the United States.

Duana Fullwiley and Linda Hunt provide developed views of this perspective in their accounts of how geneticists in the United States make use of racial categories. Fullwiley finds that genetics researchers are guided, first, by an anxiety over forms of “admixture,” and, second, by an enduring investment in seeing whiteness and blackness as polar oppositions. In an effort to collect “racially pure DNA,” they automatically exclude from their sampling strategies “anyone who reported racial mixing in their genealogies for the past three generations” (2008:159). Hunt’s research reveals a pervasive belief “that racial/ethnic labels and groups are monolithic through time, and that racial intermarriage is a rather new and exceptional event” (2008: 354). Hunt found that researchers were clearly committed to “*treating ‘admixture’ as an exceptional event*, which did not require rethinking the classification of categories” (2008:355). Most surprisingly—from a genomic perspective—Fullwiley finds that “not only were African Americans and Caucasians seen as different, they were tacitly understood to be two sides of a symmetrical arrangement in the physical world, of a kind that characterizes many patterns in nature but that runs counter to most accepted ideas of human genetic diversity. That is, each was perceived as the other’s opposite race” (2008:162). Concomitant with this view was a belief “that racial/ethnic groups are primarily endogamous” (2008:358). As Hunt points out, “These assumptions are contrary to much of what is known about human population history.” But these assumptions endure because they are undergirded by the profound belief in hypodescent in the United States.

Based on my interviews and discussions with geneticists at INMEGEN, these assumptions are also rather contrary to how they think about and analyze the genetic structure of Mexicans. The first and most crucial point of contrast is that “admixture” is the starting point and founding assumption, rather than being construed as something that should be controlled for or avoided. Second, and in some sense following from this point, there is not a similar polar opposition of white and black in Mexico.¹⁸ There is, arguably, a parallel binary of “mestizo” and “indigenous.”¹⁹ But because the former is seen as partly deriving from the latter, this dynamic—as enshrined in the notion of “la raza cosmica”—is often construed in terms that contrast with racial discourse in the United States.²⁰ Indeed, these two points of contrast indicate the role or relevance of the ideology of *mestizaje*,²¹ which, while it certainly should be regarded as racial, stands in stark contrast to racial thinking evidenced in the genomics research examined by Fullwiley and Hunt. The intriguing point here is that, the approach favored at INMEGEN—stressing admixture and highlighting the social and historical factors influencing the shape of the national genome—could serve as a powerful corrective to the genomic projects on race in the United States, informed as they are by notions of hypodescent. This suggests an opportunity to do more than try to conclude emphatically whether INMEGEN’s project is “racial”—instead, these contrasts and the varieties of ways race may or may not enter into genomic research suggests the need to expand upon what we assume to be the contours and contents of racial thinking.

This point became clear to me as I recognized that, in addition to an emphasis on admixture, the prevailing view at INMEGEN is of “the Mexican genome” as a highly plastic artifact of cultural practices and political interests. This understanding or depiction of genomes could not be more distinct from the work of geneticists in the United States and is captured well in this passage from the much-heralded publication of results of the Mexican Genome Projects in *Proceedings of the National Academy of Science*:

During the pre-Hispanic period, ethnic groups living in Central and Southern Mexico were more numerous and had stronger political, religious, and social cohesion than ethnic groups from the northern region. African slaves were brought into the region after a notable reduction of the Amerindian population, due to epidemics, between 1545 and 1548. Since then, admixture processes in geographically distant regions have been affected by different demographic and historical conditions, shaping the genomic structure of Mexicans. These factors have generated genetic heterogeneity

between and within subpopulations from different regions throughout Mexico. (8614–8615)

Rather than view “the genome” as an independent entity, somewhere floating in the realm of nature, this assessment construes the contemporary genetic structure of Mexicans as an outgrowth of historical processes that unfolded distinctly across a geographically varied country, in which cultural formations played a substantive role in shaping “genetic heterogeneity” across the nation. As well, they make careful note that current identifiers of states should not be taken as an “unchanging” locus of identity. As the narrative concludes, “Even though participants in our study came from regions corresponding to modern political divisions, they represent different demographic dynamics, human settlement patterns, and Amerindian population densities.” The heterogeneity that is stressed in this view contrasts sharply with expectations in the United States that racial identities are fundamentally homogeneous. While the project’s aim was to establish that there exists a sufficient basis to speak of a common national genetic structure, it was also designed to consider and account for regional variations that reflect distinct cultural and historical processes. That social forces play a constitutive role regarding genomes is rarely granted much credence in race-based projects in the United States that seek instead to naturally differentiate between whites and blacks.

So, is the “Mexican Genome” a racial project? At the simplest level, considering the obvious role of “mestizo nationalism” informing the project, the fairly immediate answer is yes.²² But reaching this conclusion too swiftly or reductively would lead to the mistaken assumption that the work of INMEGEN resembles racial genetic projects in the United States, which it manifestly does not. Importantly, the approach taken at INMEGEN could potentially stand as a corrective to the racial approach of researchers in the United States, and its procedures and assumptions hew closely to the national genomes examined by Sung and Liu, which they specifically assert are not racial. The importance both of this question and of understanding the types of claims deriving from genomics projects, as well as the assumptions informing such work, suggests an opportunity here: to consider the characteristics and contours of racial thinking in broader terms than its current definitions in the United States have suggested. With this possibility in mind, I turn now to the intriguing work on nonhuman races, as in *razas de maíz* at LANGEBIO.

LANGEBIO (Laboratorio Nacional de Genomica para la Biodiversidad) was established in 2005 and charged with focusing on the nation’s biodiversity, but its founding was principally in response to a U.S.-based project to sequence the

“maize genome.” The Maize Genome Sequencing Consortium (MGSC), initiated in 2005, involved researchers from Cold Springs Harbor, Washington University, and other academic institutions, supported by a \$32 million grant from the NSF, USDA, and DOE. As the Director of LANGEBIO, Luis Herrera-Estrella, explained to me, it was embarrassing enough to be ignored by the International HapMap, but to have been left behind while “gringos” sequenced the “maize genome” would have been humiliating and intolerable. Hence, alongside the MGSC’s sequencing of the B73 inbred maize line—the dominant source of the worldwide commercial crop—researchers at LANGEBIO sequenced “el genoma de la raza *Palomero Toluqueño*,” an early domesticated maize. The two projects’ findings—published side-by-side in *Science* in 2009—are easily distinguished. Where the U.S. effort trumpeted the discovery of the singular “genome of maize,” and “the maize Hap Map,” LANGEBIO’s account promised “insight into maize genomic diversity” via an ancestral population that was cultivated into a variety of distinct “razas” or “landraces.” Most strikingly, the U.S. effort presented “the genome” of B73 as if it was an independent, natural entity, rather than the highly selected for agricultural staple that it is today. This reflects something of a schizophrenia highlighted in the opening paragraph of the B73 paper, which noted both that “maize is an important model organism for fundamental research into the inheritance and function of genes, the physical linkage of genes to chromosomes, the mechanistic relations between cytological crossovers and recombination, the origin of the nucleus, the properties of telomeres, epigenetic silencing, imprinting, and transposition,” and “an important crop” (2009:1112). That is, there are two sides to the maize genome—one millions of years old, the other, which we are most familiar with and dependent upon, the product of human tinkering over the last 9,000 years. U.S. researchers strained to look past that domesticated side of maize, gazing toward “a paleopolyploid ancestor” of some 70 million years ago.

Researchers at LANGEBIO, instead, aimed “to gain insight into maize genomic diversity”; their article in *Science* opens: “Maize was domesticated from *Balsas teosinte* ~ 9000 years ago, resulting in a wide variety of landraces” (2009:1078). Sequencing a genotype of *Palomero Toluqueño*, a highland popcorn from San Lorenzo Teotuitlán, they compared its genetic features with that of B73, looking for allelic variations that would have been selected for during the early cultivation of maize. Presenting this study in Mexico at the Congreso Nacional de Biotecnología y Bioingeniería, lead author and cofounder of LANGEBIO, Jean-Philippe Vielle-Calzada, construed *Palomero Toluqueño* as a window onto at least a dozen other “razas mexicanas,” underscoring that its distinctive genetic features were a basis for

comprehending the process of artificial selection that led to the domestication of maize varieties.

The contrasting styles of genomic analysis between MGSC and LANGEBIO are intriguing. Certainly, they are a reflection of the global, financial, and political hierarchies of genetics research, where projects conducted in the United States are generally greatly advantaged and so can cast their interests and findings in the broadest manner possible. Meanwhile, genetics in Mexico—whether conducted on humans or plants—is often racing to keep up, and they are forced to tailor their projects in a manner that dovetails closely with national interests and resources.²³ In this regard, it is perhaps not surprising that there is a resonance between the projects at INMEGEN and LANGEBIO, one that is heightened in contrast to work conducted in the United States. Both Mexican genomic undertakings were framed in national terms, either for the “mestizo population” or the four ancient razas de maíz that constituted the country’s greatest agricultural resource—one that is increasingly imperiled by U.S. agricultural dominance as well as China’s emergent work on maize.²⁴ But more to the point, given the contrasts in understanding race already highlighted above, in what ways can the study of razas de maíz at LANGEBIO suggest the need to expand what counts as racial analysis for cultural anthropologists in the United States?

I began first with the question, why do they use “raza” to characterize varieties of maize? This usage is simultaneously mundane and unusual. The notion that there are races of corn is commonplace in Mexican public discourse. If anything, this concept has been intensified by the recent furor and anxiety over the threat of contamination posed by transgenic corn from the United States.²⁵ But notably, too, this use of “raza” fits in with arguably the most common form of usage of the term in Mexico, which is to characterize *nonhumans*. The variety of applications of such uses of “raza” in Mexico is widespread and striking. There are *razas de perros* (dogs), *toros* (bulls), *caballos* (horses), as well as of *gallos* (roosters) and *gallinas* (hens). No doubt, these are probably not the associations that most frequently come to mind. That distinction likely goes to José Vasconcelos’ phrase, immortalized as the motto of UNAM, “Por mi raza hablará el espíritu” (for my race, the spirit will speak). “La raza” can refer to the powerful but somewhat unfocused or unsettled connection to Spain, historically and contemporarily; but also to the people of Mexico, as represented in the El Monumento a La Raza in Mexico City, which gives its name to a nearby subway stop. But such charged and vivid symbolic senses sit alongside mundane uses to characterize breeds generally.

What do all of these breeds have in common with maize? The key commonality is that they are all domesticates and, as such, participate in complex companion species relations (Haraway 2007). At first, I mistakenly thought that “raza” was being used taxonomically, as a generic referent for species. But I found it is only applied to certain kinds of species—domesticates. This underscores an important point: this designation of race is not about nature in the way Anglo theorists typically assume racial thinking to operate. Rather, the ineluctable blend of culture and biology in the practice of domestication, here challenges the very idea that naturalization is a key component of racial thinking.²⁶ As well, these razas are not fixed types of the order that racial analysts in the United States remain on guard against, anticipating a return of eugenical thought. Instead, as breeders generally know, these razas are fairly plastic—they are the outgrowth of centuries of tinkering, yet they remain susceptible to losing their characteristics within a generation if they are not bred properly. This dimension of raza—though contrary to operations of race in the United States (Hartigan 2013a)—shared something with the genomic analysis at INMEGEN. Just as with razas de maíz, at INMEGEN they viewed the mestizo population as a product of culture and history contouring genes. Similarly, with razas de maíz, there is something both obvious and surprising about this assignation. Maize pervades Mexican society and is, unquestionably, a singular basis for its existence, historically and contemporarily, but also materially and symbolically.²⁷ In this regard, “raza” applies more readily to maize than to other domesticated plant species—in the same way that “la raza” names the “unique population” of Mexico.

What is central here, though, is that “razas de maíz” are lodged squarely in a tradition of racial thinking that extends back to the word’s first usage—to talk about domesticates and to establish parallels with humans.²⁸ By the time “race” emerged in the English language in the 16th century, it already had a lengthy career in French and Spanish. As historian David Nirenberg explains, “words like *raza*, *casta*, and *linaje* (and their cognates in the various Iberian romance languages) were already embedded in identifiably biological ideas about animal breeding and reproduction in the first half of the fifteenth century” (2009:252).²⁹ Notably, too, this usage was not deployed to talk about Others; rather, it was articulated to explore the possibility of parallels between people and animals. Charles de Miramon, who locates the origin of “race” in France in the 14th century, writes, “the word was not coined to denigrate a despised minority or an alien people with a strange skin color” (2009: 201). Rather, race emerged from “the ennobling of dogs” as

a parallel to “the rebirth of noble blood” and the idea of “prince of blood” (215) in 15th century discourse that featured “the emergence of animal noble races” (209), particularly “the invention of the noble race of hounds” (208). Such usage is neither reducible nor equivalent to forms of *naturalization* since, as domesticates, these entities are far from being natural. Nor do they represent *dehumanization* through rendering humans as animals because aristocrats were articulating ideas about lineage through their dogs.³⁰ This sense is retained today in the doubled meanings of “breeding,” connoting a high-class status/lineage (“good breeding”) and the basic sexual function of reproduction. These dimensions of “*raza*” suggest a sort of thinking in parallel between people and animals and then, later, plants, such as maíz. Certainly this sense of paralleled identity is evident in Mexican thinking about corn, both currently and in the pre-Hispanic era (Staller 2009).

My initial conversations about razas de maíz were mostly with Jean-Philippe Vielle-Calzada. Born in Monterrey, Mexico, Vielle-Calzada trained in agronomy at the University of Louvain in Belgium and received his PhD in plant genetics from Texas A&M. When we first met, he was wearing a pullover sweatshirt from Cold Spring Harbor, where he worked from 1996-1999 on a postdoctoral fellowship. He is a tall man with long hair and an engaging presence. When he talked about maize, he described a dynamic species, one that had formed in relation to the heavy metals in the soils of the Trans-Mexico Volcanic Belt. The sequencing work that he conducted with Herrera-Estrella showed that genes related to tolerance of environmental stressors and to heavy-metal detoxification were present in both *Palomero* and B73, but absent in their ancestor teosinte. This suggests the role of domestication in selecting for plants that were able to withstand the concentration of metal in volcanic soils. It also highlights the dynamic relation that maize has with humans, such that it is as much a cultural artifact as a biological one. For that matter, maize is completely dependent upon humans since it is unable to reproduce without our assistance—a clear case of a companion species. But through this coalescence of human interest and maize genes, the ancient razas spread out from central Mexico, expanding into different ecological and geographical regions across the world, until it became one of the planet’s most dominant crops. This makes the usage of *raza* to characterize it all the more interesting, because it is such an unnatural entity. Gazing on its genome through the morass of sequencing data, Vielle-Calzada saw the handcrafting of human intention and interest on display; much as did researchers at INMEGEN, when they described the “Mexican genome” as a cultural-historical-biological artifact rather than a natural object.³¹

When plants are linked with race, cultural anthropologists tend to assume this linkage is really about people, and thus opt for an ideological analysis of how the discourse on these objects serves as a means of naturalizing social categories or contestations (Raffles 2011). But this approach, which makes it very hard to talk directly about the plants involved, leads us away from recognizing the depth and range of nonhuman uses of race; uses that we must begin to comprehend if we are going to advance current understandings of racial thinking. The ideological analysis of race in relation to plants is well exemplified by Jean and John Comaroff's account of South African public discourse over a disastrous series of fires that swept the country in 2000. They discern in this discourse "a new post-racist form of racism," concealing itself in the language of alien and native plant species. This discourse featured "the deployment of nature as alibi, as a fertile allegory for making people and objects strange, thus to forge critical new social and political distinctions" (2001: 627–628). In white South Africans' attempts to assess the role of certain non-native plants in fueling the fires, the Comaroffs diagnose "an instance of 'ideology in the making'" (629), concluding that "the anxiety over foreign flora gestured toward a submerged landscape of civic terror and moral alarm" (630).³² Reading this landscape for its racial content, they rely upon Freudian tropes—transference, displacement, and overdetermination—as ideological operations in discussions about these species. This approach assumes that talk about plants is principally about human affairs and that natural objects serve to affirm or ratify social concerns and interests. This perspective also assumes that race resides in the social realm and is then illicitly extended into the natural domain. But the case of the "razas" suggests otherwise.

"Razas de maíz" participate in a tradition of using race that precedes its scientific application to humans by roughly several hundred years. That such uses of race on nonhumans continue to this day indicates there is more to razas de maíz—or razas de perros, or toros, or caballos, etc.—than just an ideological reflex of efforts to naturalize human social relations of domination and exploitation. These companion species, rather, repeatedly throw the naturalness of both the human and the nonhuman into question in an ongoing, speculative manner because of the plasticity and instability of these biocultural entities. The "razas" are not mere "alibis" or ciphers for a "submerged landscape" or "ideology in the making"—they are lively materials in broad circulation, out of which recognizable cultural forms are cultivated. As cultural and genetic artifacts, the products of thousands of years of pre-Hispanic practices of cultivation, the "razas de maíz" notably challenge prevailing assumptions that "race" is strictly a product of the modern era, prompting

the consideration that forms of racial thinking extend, rather, to some of the earliest practices of domestication. Such artifacts remind us, too, that species are not the fixed entities they seem to be when mobilized by or becoming the objects of totemic thought. They are malleable, artificial entities, too, that may enter into all the densities of companion species relating, opening up questions about the nature of species. And, as historian Michael Banton found some time ago, “this leads straight to the central problem of racial thought, one that runs through from the seventeenth century (if not earlier) to the present and is far from settled: *What is the nature of species?*” [emphasis added] (1987:2)?

CONCLUSION

A principal, long-standing and well-founded anxiety animating critical research on race in the United States is that racial categories will be naturalized through ideological uses of scientific research. This is evident in the concentrated, developed attention cultural anthropologists have devoted to examining genomic research (Goodman et al. 2003; Koenig et al. 2008; Whitmarsh and Jones 2010). But in pursuing genomics—and especially in doing so across national borders—we have carried assumptions about what race looks like and how it matters that are principally contoured by and reflective of its operations in the United States. Here I hope to have contributed to expanding the analysis of racial thinking in two ways: first, by critically framing some of the challenges entailed by translating concepts and perceptions of race across different national contexts; second, by arguing that forestalling an attention to the biocultural forms that uncomfortably trouble a social constructionist stance impedes us from recognizing the great breadth and depth of racial matters. By regarding such forms principally as ideological constructs, we lose sight of the dynamism of the biological and the genetic domains (Hartigan 2013b), as well as the perplexing, intriguing range of nonhuman uses of race. The case of “razas de maíz” indicates that racial thinking does not strictly or perhaps even primarily concern itself with crafting and contemplating natural objects with which it then strives to affirm or reproduce an existing, hierarchical social order. It operates, as well, with artificial, cultivated objects that are useful for pondering the nature of species. As well, the “razas” suggest that racial thinking is both older and more deeply engrained than the modern forms with which we have been most concerned; it may well derive from processes of domestication that are quite ancient and encompass a range of contradictory, complex ideas and practices concerning the relations of humans and nonhumans. In this regard, and considering how profoundly and powerfully race is still with us, it is worth acknowledging

that there is probably more to it than we have imagined so far, and that we need to get better at recognizing the comingling of culture, biology, and genes that it sometimes names.

ABSTRACT

This article confronts the cultural limitation of critical race work in the United States by examining genomic practices at two national institutes in Mexico—one focused on people and aimed at sampling “the Mexican genome,” the other focused on plant biodiversity and “razas de maíz” or races of corn. The human genome project emphasizes admixture in ways that seem to confound claims about the racialization of genomics research in the United States; the biodiversity project highlights the broad extent to which “race” is also about nonhumans. Taken together, these projects suggest a greater breadth and depth to racial thinking than is typically considered in U.S.-based accounts. Grasping this wider scope to race involves, first, foregoing a strict delineation of the social and the biological and, secondly, recognizing that uses of race on nonhumans indicate that racial thinking entails profound questions concerning the nature of species. “Razas de maíz” suggest that racial thinking is both older and more deeply engrained than the modern forms with which we have been most concerned; it may well derive from processes of domestication that are quite ancient and encompass a range of contradictory, complex ideas and practices concerning the relations of humans and nonhumans. [genomics, race, Mexico, anthropology of science]

NOTES

1. This opposition runs throughout the central work on race from a cultural perspective, consistently with the assertion that attention to the biological is diversionary and we should rather focus strictly on the social (Harrison 1998; Mullings 2005). In contrast, emergent work on race and genomics highlight the need to think, instead, via concepts such as “biopolitics” (Whitmarsh and Jones 2010; Schramm, Skinner, and Rottenburg 2012). Importantly, Catherine Bliss (2012) argues that genomics can be turned toward the social justice concerns that cultural anthropologists often see as imperiled by this form of attention.
2. In addition to collected volumes on this subject (Goodman, Heath, and Lindee 2003; Koenig, Lee, and Richardson, 2008) see the compilation of cautionary accounts from cultural anthropologists (predominantly) maintained by the Social Science Research Council: <http://raceandgenomics.ssrc.org/>.
3. S.O.Y. Keita and Rick Kittles (1997) offer the following definition: “Racial thinking rests on the belief that visible human variation connotes fundamental deep differences within the species, which can be packaged into units of near-uniform individuals.” An important point they stress is that it “is not necessarily synonymous with racist thinking” [emphasis in original]. Rather, the conceptual core involves “the vestiges of typological or categorical thinking as applied to humans.”
4. As Faye Harrison emphasizes, racism exists when “categories of human beings are subjugated or privileged because of differences purported to be fundamentally natural and/or biophysical” (1998:613). On the ways that idioms of nature provide a template for our understandings of inequality and identity, as well as racism, see Goldberg (1993) and Jahoda (1999).
5. There is a developed attention in cultural anthropology to current forms of eugenics, the potential “return” of scientific racism, and associated practices of dehumanization. In particular,

- see Groce and Marks 2000; Holt 2002; Mamdani 2002; Taussig, Heath, and Rapp, 2003; Paul 2004; Baker 2010; Rozema 2011. Also see Hammond and Herzig 2009.
6. In relation to genetics, Peter Wade argues that “we need a broader idea of what naturalization and biology mean.” Naturalization, for instance, “may entail genetics but it may not; it may entail biology, but biology itself has to be seen as entailing more than ‘unchanging and eternal essences’” (2002:109).
 7. For a sampling of the broader array of ways that race and nature intertwine, see Menchaca (2011), Carbado (2005), as well as, Moore, Kosek, and Pandian (2003). Also, it bears noting that forms of dehumanization operate in far more than just racial registers (Haslam 2006).
 8. Mexican philosopher Francisco Bulnes (1849–1924) notably used “raza del maíz” to identify Latin Americans as one of three global races; the other two being races of wheat (Europeans) and rice (Asians) (1898 [1998]). See Vargas (2000) for a developed explication of how Bulnes views fit into a broad philosophy of race in Mexico.
 9. In this effort, I am both following and aiming to contribute to the developed critical questioning of race across different national contexts. See Harris (1974, 1993), Bourdieu and Wacquant (1999), French (2000), Telles (2006), Beserra (2011).
 10. “Mapa del Genoma de los Mexicanos” is the phrase used in the press release issued by INMEGEN (May 11, 2009) to announce the publication of their findings in *PNAS*.
 11. “Mexico to map its peoples’ genes,” Laura Vargas-Parada and Javier Cruz, *SciDev.Net*, July 29, 2005.
 12. The association between race and disease is often a function of unequal access to health care (Smedley and Stith Nelson 2004; Barr 2008; Nelson 2011; Kreiger 2011). But recent ethnographic work on this subject is illuminating the complex interplay of biology and culture, particularly with sickle cell anemia (Rouse 2009; Fullwiley 2011) and asthma (Whitmarsh 2008).
 13. For a discussion of the International HapMap in relation to race, see Hamilton (2008) and Reardon (2004). On the international scope of genomics projects, additionally see M’charek (2005), Thacker (2006), and Rajan (2006). Also see Kim TallBear’s work on the role of race in the Genographic Project (2007).
 14. The question of national differences in science has been a consuming question for science studies (Jasanoff 2007). More specifically, regarding cultural anthropological studies of genomics, questions of the significance of national contexts in shaping an interest in genomes has been there since the beginning. See Paul Rabinow (2002) and Mike Fortun (2008).
 15. On the Tuskegee syphilis experiment, see Reverby (2009, 2000) and Jones (1993).
 16. See Stephen (2007), Murguía and Saenz (2002), De Genova (2005), Juárez (2006), Muñoz (2008), Villarreal (2010), and Roth (2012).
 17. On mestizo nationalism, see Benítez (1992), Lomnitz (2001), Alonso (2004), Chorba (2007), and Tarcia (2008). Considering the distinctive texture this ideology takes in relation to population genomics at INMEGEN, see Schwartz-Marín and Silva-Zolezzi (2010).
 18. On the particular dynamics of blackness in Mexico, see Vinson and Restall (2009), Bennett (2010), and Lewis (2012).
 19. On mestizo identity and its various transformations, see Whitten (2007) and Hale (2006); on the interplay of mestizo and indigenous identities, see de la Cadena (2000), Field (2002), and Wade (2010).
 20. This conceptualization of race was first formulated by José Vasconcelos (1882–1959) and remains popular in Mexico. Nicandro Juárez argues that, in articulating this concept, Vasconcelos “was reacting to Anglo-American racial theories” (54) (*Aztlan*, 3(1): 51–82). Also see Miller (2004).
 21. In addition to above-cited works, see special issue on mestizaje in *Journal of Latin American Anthropology* (1996, edited by Charles Hale), as well as Pérez-Torres (2006).
 22. The project at INMEGEN has generated a good deal of scholarly attention exactly on the confluence of issues around race, genetics, and mestizo/national identity in Mexico. In Carlos López Beltrán’s *Genes (& Mestizos: Genómica y Raza en la Biomedicina Mexicana* (2011), see chapters by Ernesto Schwartz Marín as well as Beltrán and Francisco Vergara Silva specifically

- on INMEGEN's role; additionally see chapters by Rasmus Winther, Yuriditzi Montijo, and Alfonso Arroy Santos on genetic dimensions of racial identities and discourse in Mexico.
23. For a cultural perspective on science in Mexico, see Gonzalez (2001) and Laveaga (2009).
 24. Elizabeth Fitting (2010) provides a developed account of the intense social and political debates in Mexico over genetically modified maize. On "mestizo narratives" related to plants in Mexico, see Cori Hayden (2003:116–119).
 25. A surge in public discourse related to razas de maíz occurred when the Distrito Federal government in Mexico City launched a preservation policy, "Programa de Protección de las Razas de Maíz del Altiplano Mexicano para el Distrito Federal" (October 29, 2009).
 26. An interest in domestication is a long-standing, discipline-wide concern of anthropology (Shanklin 1985) but has recently expanded considerably (Mullin and Cassidy 2007; Kirksey and Helmreich, 2010).
 27. The literature on maíz in Mexico is extensive. In particular, see Sandstrom (1991), Fox (1993), Warman (1996), Gonzalez (2001), Esteva and Marielle (2003), SAGARPA-SIAP (2004), Antal, Baker, and Verschoor (2007), and Staller (2009).
 28. For a genealogy of "razas de maíz," see Wellhausen (1950). He tracks the concept back to early Spanish chroniclers, such as Bernardino de Sahagún (1499–1590), up through agronomists Eduardo Chávez (1913) and Edgar Anderson (1946).
 29. Another crucial historian's work on race and raza is Martínez (2008).
 30. A similar example involves bears and heraldry, as extensively chronicled by Michel Pastoureau (2012).
 31. Similar view, in terms of a particular gene, in Duana Fullwiley's *The Enculturated Gene* (2011).
 32. Marisol de la Cadena offers a contrasting account of nature via the concept of "indigenous cosmopolitics" (2010).

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