The "Contemporary Synthesis"

When Politically Inclusive Genomic Science Relies on Biological Notions of Race

*By Duana Fullwiley**

ABSTRACT

This essay outlines the emergence of a contemporary synthesis regarding racial thinking in genetic science and in society more broadly. A departure from what Julian Huxley in 1942 termed the "modern synthesis," the contemporary version does not purport to leave race thinking behind in favor of evolution, population genetics, and population-based accounts of natural selection and human diversity. Specifically, the contemporary synthesis blends old concepts (such as that of pure human "types," located within continental land masses) with new attitudes (democratic inclusion, multicultural diversity, and antiracism). Through various examples, the essay shows how this new synthesis combines ideas about human biological difference that draw on measures of physical characteristics and human genetic material that are both *race* and *population* based, yet conflated. This specific amalgam allows old notions of racial types to thrive through conceptual framings that comprise ideas that were once imagined to have the potential to liberate society from racial thinking—and that today remain attached to ideas of progress. As an emergent dynamic, the contemporary synthesis holds the possibility of reinvigorating racism, while simultaneously possessing the potential to promote antiracist science education, disease awareness, and social justice efforts.

IN HER NOW-CLASSIC WORK *The Idea of Race in Science*, the historian Nancy Stepan's principal concern was to "point out the deeper continuities found in racial science underlying discontinuities and change on the surface." With this she hoped to trouble a field interest for the history of science: that of possible "scientific revolution."[1] Such a stern focus on the persistence of race still makes sense so that we might diagnose its wide-ranging and often contradictory legacy. We also have to be careful, however, not to overdichotomize change versus core consistencies as scholars of the contemporary moment engage with historians on this issue. In fact, certain "discontinuities" regarding

* Department of Anthropology, Stanford University, 450 Serra Mall, Building 50, Stanford, California 94305-2034.

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[1] Nancy Stepan, *The Idea of Race in Science: Great Britain, 1800–1960* (London: Macmillan, 1982), p. xxi.

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race in the practice of science highlight dynamics and political shifts that amount to *change* that is joined at the hip to *stasis*. It is my view that the changing political articulation of race in contemporary science allows for core racial beliefs to remain intact.

Today, many genetic scientists deploy a powerful mix of concepts. On the one hand, they openly accept and operationalize highly racializing notions of "Old World" human "types." On the other hand, they themselves—as well as various humanities scholars and social scientists who embrace their work—leave these ideas largely unquestioned when they utilize them for liberalizing, educational, genealogical, and antiracism efforts. I argue that we are witnessing an absorption of the old race thinking into modern race projects of a liberal persuasion. I call this confluence the "contemporary synthesis."

In the years between the 1993 National Institutes of Health Revitalization Act, which sought to include underrepresented groups in science, and the 2003 Map of the Human Genome, two scientific racial ideas that seemed politically opposed on the surface effortlessly combined. On the one hand, scientists and policy makers mandated inclusion and increased representation of minorities in medical research. This was largely argued in social justice terms.[2] On the other hand, a group of highly vocal scientists advanced the idea that there could be a genetic basis for racial disparities in health. They started to look at genetic differences within people classed according to U.S. racial categories and also argued that these broad categories might form genetic clusters.[3] They began formulating their case in 2000, when leaders of the Human Genome Project announced that the human genome contained no real racial differences and that we are all just one race—"the human race."[4] By 2003, those who disagreed had penned a series of articles, organized conferences, and formed networks and collaborations. These "just one race" detractors were not scientific racists. Several of them came from minority groups and had embraced the logic of the Health Revitalization Act as it sought to include underrepresented groups in science. Only now, the political inclusion of minorities for which they were advocating centered on inclusion within genetic and genomic studies.

In this essay I examine the ways that scientists and nonscientists deploy racialized genetics to address racial problems in society. The technologies in question have been developed in academic labs as basic scientific tools for use in forensics, in the elucidation of genetic components of disease, and in proposals to reduce the disease burden in minority communities. The researchers involved in such work believe that there is at some level a biogenetic reality to race categories. Not to explore it, they argue, would be tantamount to racism and a disservice to minority communities.[5] With these concerns,

[2] Steve Epstein, *Inclusion: The Politics of Difference in Medical Research* (Chicago: Univ. Chicago Press, 2007).

[3] Neil Risch, Esteban Buchard, Elad Ziv, and Hua Tang, "Categorization of Humans in Biomedical Research: Genes, Race, and Disease," *Genome Biology*, 2002, *3*(7):1–12. See also Francis Collins, "What We Do and Don't Know about 'Race,' 'Ethnicity,' Genetics, and Health at the Dawn of the Genome Era," *Nature Genetics Supplement*, 2004, *36*:S13–S15; Burchard, Ziv, Natasha Coyle, *et al.*, "The Importance of Race and Ethnic Background in Biomedical Research and Clinical Practice," *New England Journal of Medicine*, 2003, *348*: 1170–1175; and Tony Frudakis and Mark Shriver, U.S. Patent No. 20040229231 (filed 18 Nov. 2004), "Compositions and Methods for Inferring Ancestry."

[4] At this celebratory moment, Francis Collins, who led the NIH-funded arm of the effort, told the world: "I'm happy that today the only race we are talking about is the human race"; the remark was met with applause. See White House, Office of the Press Secretary, "Remarks by the President, Prime Minister Tony Blair of England, Dr. Francis Collins, Director of the National Human Genome Research Institute, and Dr. Craig Venter, President and Chief Scientific Officer, Celera Genomics Corporation, on the Completion of the First Survey of the Entire Human Genome Project," 2000, http://clinton3.nara.gov/WH/EOP/OSTP/html/00628_2.html (accessed 1 Feb. 2014).

[5] Risch *et al.*, "Categorization of Humans in Biomedical Research" (cit. n. 3); Carlos D. Bustamante,

scientists and their tools often leave the lab and enter into social fields such as education, law, genealogical societies, public health, media, and commerce.

The geneticists who describe DNA differences between groups that were historically thought of as racially distinct do so by adopting the scientific term "bio-geographical ancestry" or, simply, "genetic ancestry." The determination of ancestry through autosomal DNA analysis relies on human genetic sampling in discrete geographical continental regions. It requires limiting history to two "depth of time" scales: the twenty-first-century "present" and the Age of Conquest "past," when the populations of the "New World" encountered each other. That is when the sexual politics of enslavement and conquest resulted in new dynamics of genetic mixing that are imagined not to have taken place before. When present-day people display such mixing, geneticists term this "admixture." As I show in more detail below, at their core bio-geographical ancestry notions rely on typological human categories that serve as the referents for any human sample being analyzed. The same applies to the many technologies that rely on autosomal DNA markers for ancestry tests available today.

A departure from what Julian Huxley in 1942 termed the "modern synthesis," the contemporary version does not purport to leave race thinking behind in favor of evolution, population genetics, and population-based accounts of natural selection and human diversity.[6] The modern synthesis thinkers eventually decided that these emphases would lead to a kind of salvational and "humanist progress."[7] Today we are seeing a new synthesis of race science, which also imagines itself as progress. Specifically, the contemporary synthesis blends old concepts (such as that of "pure types," located within continental land masses) with newer attitudes ("democratic inclusion," "multicultural diversity," and "antiracism").[8] All the while, this synthesis combines ideas about human

Francisco M. De La Vega, and Esteban G. Burchard, "Genomics for the World," *Nature*, 2011, *475*:163–165; and personal communication with the geneticist Rick Kittles.

[6] Peter Bowler writes of the modern synthesis: "The old typological and developmental viewpoints were giving way to a perspective in which adaptation, migration, isolation, and geographical distribution played more important roles. Field naturalists now realized that each species could not be treated as a fixed type with only local variations. Many species were broken up into a collection of subpopulations by geographical barriers, and each population was adapting to its own local environment the best it could." Peter Bowler, *Evolution: The History of an Idea* (Berkeley: Univ. California Press, 1984), p. 334. See also Theodore Dobzhansky, *Genetics and the Origin of Species*, 3rd ed. (New York: Columbia Univ. Press, 1951); and Julian Huxley, *Evolution: The Modern Synthesis* (1942; Cambridge, Mass.: MIT Press, 2010).

[7] Julian Huxley, *The Humanist Frame* (New York: Harper & Brothers, 1961). In the 1960s Huxley eventually comes to see cultural progress as the result of evolution being self-aware in the mind of "man." He writes, "Today, in twentieth-century man, the evolutionary process is at last becoming conscious of itself and is beginning to study itself with a view to directing its future directions. Human knowledge worked over by human imagination is seen as the basis of human understanding and belief, and the ultimate guide to human progress" (p. 7).

[8] In 2008 I discussed these issues in an ethnographic account of how self-identified minority scientists work to redress past racist inequities through genome science so as to "include" minorities in the genomic revolution. I also discussed their explicit acknowledgment that their work is "political." They aspire to embed an aspect of societal equity in their research, even as they realize that they are biologizing minority health disparities in the process. See Duana Fullwiley, "The Biologistical Construction of Race: 'Admixture' Technology and the New Genetic Medicine," *Social Studies of Science*, 2008, *38*:695–735, esp. pp. 710, 726. Other scholars have since made similar observations. See Nadia Abu-El Haj, *The Genealogical Science* (Chicago: Univ. Chicago Press, 2012), pp. 137–138; Catherine Bliss, *Race Decoded: The Genomic Fight for Social Justice* (Stanford, Calif.: Stanford Univ. Press, 2012); and Jenny Reardon, "The Democratic, Anti-Racist Genome? Technoscience at the Limits of Liberalism," *Science as Culture*, 2012, *21*:25–48. In her earlier work, *Race to the Finish: Identity and Governance in an Age of Genomics*, Reardon discusses the difficulty that well-meaning scientists have in seeing the ways that populations felt threatened by the Human Genome Diversity Project (HGDP). She makes the point that many HGDP geneticists, such as Mary-Claire King, were liberal, politically progressive scientists who had worked for social justice. By and large, the geneticists in her account did not see their science in the HGDP as

biological difference that draw on measures of physical characteristics and human biological material that are both *race* and *population* based. Specifically, it allows old notions of race types to thrive through conceptual framings that comprise ideas that were once imagined to have the potential to liberate society from racial thinking. These are allelic frequency distribution across populations, careful descriptors of ancestry, and health disparities as an effect of social and historical racial inequality.

The institutional and the societal domains where this newly capacious racial science is evident have the potential to affect critical aspects of human life today. These domains are health (regarding groups' differential risks for disease), notions of the self and identity (regarding genetic ancestry testing), and rights within the law (regarding forensics and law enforcement).[9] First I will revisit the basic characteristics of old race thinking that are detailed by Stepan and review her tentative hope in the 1980s, following the anthropologist George Stocking, for the disappearance of race in science.[10] Then I will show how the material and conceptual aspects of race science within genomics today rely heavily on notions of both race and population. Finally, I will note two brief examples of the contemporary synthesis in action.

BUILDING RACE: OLD AND NEW CONSTRUCTIONS

In the last chapter of *The Idea of Race in Science* Stepan comes to a "preliminary" conclusion that "race has lost its reality and naturalness, to such an extent that probably the majority of scientists even go so far as to consider the very word 'race' unnecessary for purposes of biological analysis." Her view at the time of writing was that the latter part of the twentieth century saw a "decline of the old racial science and the emergence of a new, non-racial, populational, genetical science of human diversity." In the history she details, race disappeared in large part because population genetics was so conceptually compelling and rigorous by comparison. She juxtaposes the then-modern period with the old regime through a reliance on race versus population, respectively. "The fundamental unit of analysis in the old racial science was the human race or racial 'type.' Races were defined anatomically and morphologically, in terms of the phenotype—that is, by detailed measurements of the shape of the skull, the dimensions of the post-cranial skeleton, by stature and by skin colour." She continues: "The unit of analysis in the new biology was, by contrast, not the race but the 'population,' defined not morphologically or behaviourally but genetically and statistically." Finally, she notes that many of the modern synthesis thinkers still allowed themselves to apply population thinking to races, where race as "population" could be seen in genetic terms. Still, she argues, these applications "were not sufficient for recognising a 'race' or for distinguishing it from any other arbitrary portion of the species."[11]

Today scientific teams most wedded to the concept of a genetic basis for race have constructed models of U.S. population genetic history that begin with the conquest of the New World in 1492. In an effort to recreate the past scene of what is now called "genetic

inherently political but, rather, framed the protests against it by indigenous peoples as political. See Reardon, *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton, N.J.: Princeton Univ. Press, 2004), pp. 113, 158–159.

[9] See Duana Fullwiley, "Can DNA 'Witness' Race? Forensic Uses of an Imperfect Ancestry Testing Technology," in *Race and the Genetic Revolution: Science, Myth, and Culture*, ed. Sheldon Krimsky and Kathleen Sloan (New York: Columbia Univ. Press, 2011), pp. 116–126.

[10] Stepan, *Idea of Race in Science* (cit. n. 1), pp. 171–172.

[11] *Ibid.*, pp. 171, 176, 177.

admixture" in the bodies of U.S. minorities (specifically of African Americans, Latinos, and Native Americans), the scientists in question attempt to model the colonial encounter through collecting DNA from people whom they consider to be from Old World populations, a designation based on samples' real or imagined continents of origin.[12]

In my ethnographic work with several labs where scientists have developed and promoted bio-geographical ancestry testing, I have seen a commonly shared process that involves procuring DNA samples from so-called Old World individuals who now live in West Africa, East Asia, and Western Europe. My informants also attempt to reconstruct a terrain called "Pre-Columbian Native America" in order to obtain DNA from people who reside in the Americas (usually as part of federally recognized tribes). They then compile DNA markers that occur at relatively high frequencies in the people they have classed as historically and relatively pure. Through a careful construction, they keep these Old World groups' boundaries intact as types by creating statistical thresholds for a series of alleles (genetic markers) that come to constitute panels of "Ancestry Informative Markers," or AIMs. From these they create a model that compares allelic frequency distributions of DNA linked to specific traits within the political boundaries that name people as Africans, Asians, Europeans, and Native Americans. In this way scientists render these groups as genetically distinct from one another. They also artificially privilege these specific demarcations for sorting human genetic diversity globally.

This can only happen once processes of "filtering," as the geneticists in question call it, take place. That is, all of the Old World human DNA variants that make it into the schema of four distinct referent populations undergo a process of purification that eliminates the obstacle of their genetic heterogeneity. In other words, the genetic markers that West Africans, for example, share are separated out from those that they do *not* share.[13] This sorting takes place through statistical analyses that assess the probability that select alleles will occur at a lower or greater frequency in one of the geographically based, circumscribed populations. This scientific practice of DNA-based group homogenization allows the biologist to perform the task of selectively differentiating between any two "continental populations" of "Africans" and "Europeans," or "Africans" and "Native Americans," and so on. Finally, study participants in today's New World are tested for these panels of markers to infer how "African," "Asian," "European," or "Native American" they are. Applications of this technology are now used routinely in medical studies to match cases and controls, in recreational genealogical pursuits to see how one's identity and genetic biology compare, and in forensic searches where eyewitness accounts are deemed unreliable in describing the race of the perpetrator.[14]

Many of these Ancestry Informative Markers are specific DNA sequence changes that have been under selection pressure for their role in some biological function (they are

[12] In my work I have also witnessed what the anthropologist Michael Montoya describes as an effort on the part of scientists to engage some aspect of the history of colonized and enslaved peoples. When doing so, this historical consciousness forms part of their political articulation that they themselves are aware of racial exploitation and racist legacies that affect the populations they study today. See Michael Montoya, *Making the Mexican Diabetic: Race, Science, and the Genetics of Inequality* (Berkeley: Univ. California Press, 2011), p. 162.

[13] As one research group clearly states: "The purpose of these filters was to eliminate SNPs [Single Nucleotide Polymorphisms] with substantially heterogeneous allele frequencies within populations of the same continental origin. These exclusions resulted in a final genomewide set of 4,222 SNP AIMs." Chao Tian *et al*., "A Genomewide Single-Nucleotide–Polymorphism Panel with High Ancestry Information for African American Admixture Mapping," *American Journal of Human Genetics*, 2006, *79*:640–649, on p. 642.

[14] Fullwiley, "Can DNA 'Witness' Race? (cit. n. 9).

Single Nucleotide Polymorphisms, or SNPs). For instance, several powerful markers in this schema are DNA changes for West Africans that protect against *vivax* malaria or that are involved in proteins that confer dark or light skin color; others include those that code for red hair and freckles, traits often associated with Northern Europeans. By bringing the biological material markers and symbolic historical markers (such as the pivotal date of 1492) into view as protagonists of sorts, one can begin to see how concepts of race now borrow the tools of statistical population genetics, albeit selectively. Here the population is race, and race is the population. The scientific frame for thinking about human diversity, however, has been constrained significantly, to four essential groups, for the purposes of the time scale in question. Nonetheless, scientists and others increasingly report that the language of genetic ancestry allows them to distance themselves from the baggage of "race" as a term. Many believe that the wording of "ancestry" is simply more precise and objective and that it provides a better vision, scientifically and politically, of New World biology than race concepts, such as the "one drop" rule.[15] ("One drop" refers to the fact that historically, in the United States, any mixed-race person with "one drop" of "black blood" would be assigned to the racial category of black.) Still, the technology itself contains the possibility of reracializing human biology, even as it may seem to offer the possibility of deracializing subjects by yielding segmented "admixed" heritage rather than the all-or-nothing race categories inherent in models of hypodescent. As the geneticist Rick Kittles (who self-identifies as African American) told me in a 2010 interview: "It's weird, because in a sense it's like a circle. You can deconstruct race [with AIMs], but you can also reconstruct race."

THE CONTEMPORARY SYNTHESIS IN ACTION

From Teaching Tools to Modern-Day Phrenology

In 2004 I went to Pennsylvania State University to learn more about AIMs from the physical anthropologist and population geneticist Mark Shriver. Shriver compiled one of the initial marker panels that I witnessed others using in 2003 in medical genetics labs at UC San Francisco. He has collaborated with others in my study at UCSF—specifically with a team of Hispanic physician-researchers who use AIMs with the hope of ascertaining health disparities in Puerto Ricans and Mexicans with asthma.[16] He has also collaborated with Rick Kittles on various projects involving the use of African-American, Caribbean, and African samples to investigate health disparities in cancer rates.

During my first few days at Penn State Shriver asked me if I would consider giving him a DNA sample and allow him to take my photograph for a project he was working on. He described the project as a collaboration with a company he consulted for, called DNAPrint Genomics. One of the technologies he and DNAPrint were attempting to bring to market had as its goal to assess a given person's AIMs-deduced continental ancestry and, from that, to allow scientists to infer a subject's facial phenotypes based on his or her DNA ancestry results for a large marker panel and a series of facial features derived from stored

[15] See Rick Kittles and Kenneth Weiss, "Race, Ancestry, and Genes: Implications for Defining Disease Risk," *Annual Review of Genomics and Human Genetics*, 2003, *4*:33–67. See also Joan Fujimura and Ramya Rajagopalan, "Different Differences: The Use of 'Genetic Ancestry' versus Race in Biomedical Human Genetic Research," *Soc. Stud. Sci.*, 2011, *41*:5–30; and Sarah E. Ali-Khan, Tomasz Krakowski, Rabia Tahir, and Abdallah S. Daar, "The Use of Race, Ethnicity, and Ancestry in Human Genetic Research," *HUGO Journal*, 2011, *5*:47–63.

[16] Fullwiley, "The Biological Construction of Race" (cit. n. 8).

test takers' photographs—all of which would be correlated. Today this technology is called molecular photofitting. In the years since, Shriver has also included genes that are actually involved in facial morphology, such as for collagen, while still relying on correlations of ancestry markers that are not involved in facial morphology. The primary application he imagines for molecular photofitting is in law enforcement. His hope is to be able to create a composite sketch of any given person, based on specific configurations of the panel of alleles that comprise AIMs. Today his tool purports to yield information not only on facial features but also on head morphology, hair texture, skin color, and specific body phenotypes that are analyzed in conjunction with Ancestry Informative Markers. It is now offered through a company called Parabon Snapshot™, which listed Shriver as a collaborator in early 2014. The company website banner reads: "By mining and modeling the human genome for associations with forensically relevant phenotypes, we produce descriptive profiles of individuals from raw DNA samples." Its "DNA Snapshot Phenotyping Service" promises "to predict face morphology and coupl[e] it with other related trait predictions, giving Snapshot the ability to produce a 'digital mugshot' of an individual corresponding to a given DNA sample."[17] (See Figure 1.)

After I declined Shriver's invitation to join his database, I learned from other researchers in the lab that the bulk of the faces and correlative DNA that made up the project at the time came from local Penn State study subjects—that is, from undergraduate students. The undergraduates had consented within the context of a large survey class called "Sociology 119: Race and Ethnic Relations," taught by the sociologist Samuel Richards. At the time, the course averaged five hundred students each semester. In a *New York Time*s article published on Shriver and Richards's collaboration, Richards is quoted as saying, "When I teach I try to demonstrate to students how complex race and ethnicity are." He followed up with: "My secondary goal is to improve race relations, and when people discover that what they thought about themselves is not true—'I thought I was Black, but I'm also Asian and White'—it leads them to have a different kind of conversation about race. It leads them to be less bigoted, to ask the deeper questions, to be more open to differences."[18] Shriver's AIMs are interpreted here as a way to make people see that it is possible to have a bit of unexpected racial continental ancestry that challenges an individual's phenotypic race and personal identity. In the classroom and in many societal settings where people are taking some version of AIMs for "fun" as a direct-to-consumer ancestry test (sold under the name AncestrybyDNA), the idea is that AIMs deconstruct race. This is the case even given that the technology fundamentally relies on putatively pure populations in the past and, spatially, on what is seen as a static Old World. Yet in other ventures, specifically for his patent application for forensic uses of AIMs, Shriver plainly states that bio-geographical ancestry "is the biological component of race."[19] Period. Here, the target user within law enforcement is not imagined to share the same feel-good ethic of dissolving racial boundaries as the Penn State students. Instead, a

[17] See http://www.parabon-nanolabs.com/nanolabs/dna-forensics/ (accessed 1 Mar. 2014).

[18] Emma Daily, "DNA Tells Students They Aren't Who They Thought," *New York Times*, 13 Apr. 2006, http://www.nytimes.com/2005/04/13/nyregion/13penn.html (accessed 2 Feb. 2014).

[19] In November 2004 Shriver filed a patent application for AIMs, along with collaborator Tony Frudakis of the now-defunct DNAPrint Genomics. There they write: "AIMs [are] a method of inferring, with a predetermined level of confidence, Biogeographical ancestry, or BGA . . . which is the heritable component of 'race.'" The patent application goes on to say that AIMs can detect "race" at several levels: first, they can distinguish Europeans from others, and, second, with a "finer" resolution, they can separate DNA into Indo-European, African, Asian, and Native American. See Frudakis and Shriver, "Compositions and Methods for Inferring Ancestry" (cit. n. 3), p. 7.

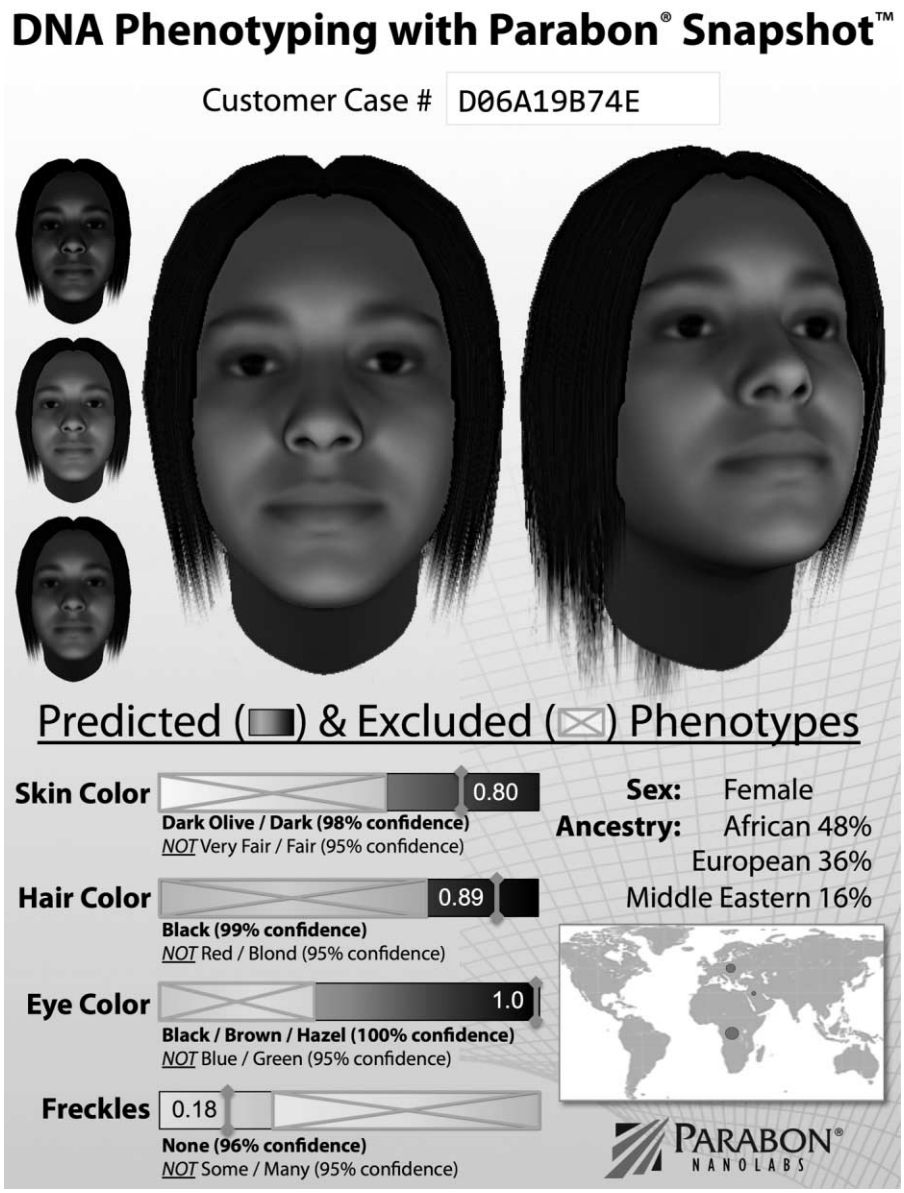

Figure 1. *A sample Snapshot report that combines several trait predictions into a unified "digital mugshot." Image courtesy of Parabon NanoLabs, Inc. In the late spring of 2014, Parabon revamped its website with new images and more information about the precision of estimating and also excluding certain phenotypes. The text that precedes this image confidently reads: "When CODIS fails to find a match . . . Send us a human DNA sample and we will produce a forensic profile containing predictions about the physical traits of its source, which can be used to generate new investigative leads." See http://www.parabon-nanolabs.com/nanolabs/dna-forensics/ (accessed 1 June 2014).*

precise racial description for the "digital mugshot" is the goal. What is perhaps more troubling is that the National Institute of Justice has funded Shriver to study molecular photofitting exclusively in black populations, such as African Americans.[20] Shriver told me that this was due to African genetic diversity and the possibilities it offers for learning about other groups down the line. When I reminded him about unfair sentencing and racial profiling of black people in the United States, he simply said, "If people don't commit crimes, then they should not have to worry about being under police surveillance." When I asked why he was doing this work, he said, "I just want to get the bad guys. In fact, this should be seen as helping the black community, since most crime that happens there is black on black crime. So hopefully this will actually make black people safer."

Contemporary "Uplift": DNA Summer Camp for African-American Teens

Farther beyond the confines of Shriver's lab, a team of geneticists, humanists, and social scientists proposes to use his technology to give ancestry genetic tests to students in public schools that have large minority populations. They specifically hope to target African-American middle-school children through a summer camp curriculum, stating that this group feels that evolutionary theories send the message that they are "less evolved." Funded by several private and public universities and the National Science Foundation, the effort is called "Using Genetics and Genealogy to Teach Evolution and Human Diversity" and is housed at the National Evolutionary Synthesis Center (NESCent). The project has been consistently led by the Penn State physical anthropologists Nina Jablonski and Mark Shriver, and several other scholars have rotated in and out as co–principal investigators since 2012. In the project description for the teens, Jablonski, Shriver, and their colleagues write: "The unique aspect of this curriculum is that it will involve the parallel investigation of individual genealogy from historical records, personal histories, and DNA markers. Starting with the 'study of me,' students will be introduced to the principles of inheritance, modern genetics, and the evolutionary process."[21]

The first proposal was inspired by the African-American Studies scholar Henry Louis Gates, Jr., who "in his widely televised documentaries about the heritage of famous African Americans . . . demonstrated the power and educational efficacy of multidisciplinary explorations of personal ancestry."[22] Jablonski approached Gates with the idea (he had already collaborated with Shriver for his PBS series *African American Lives*, which aired in 2006).

Gates emphasizes in his films that ancestry testing is a way to restore history lost to African Americans when the paper trail of traditional genealogy hits a dead end. The last episode of the first series of *African American Lives* focused largely on DNA tests, including AIMs "admixture" analyses. In this segment Gates's guests all learned that they were some combination of "African," "European," and, to a lesser degree, "East Asian" and "Native American." The ancestry information was delivered in exact percentage terms. In one scene Gates and Shriver sit in front of a computer monitor while a photo of Gates's head and face floats in 3-D. A new image then appears of different human faces from the various "races of man"—but it starts with an ape. Skulls of different shapes are

[20] See P. Claes, D. K. Liberton, K. Daniels, K. M. Rosana, E. E. Quillen, *et al.*, "Modeling 3D Facial Shape from DNA," *PLoS Genetics*, 2014, *10*(3):e1004224.

[21] See http://www.nescent.org/science/awards_summary.php?id=369 (accessed 2 Feb. 2014).

[22] See https://www.nescent.org/cal/calendar_detail.php?id=856 (accessed 2 Feb. 2014).

sketched directly above the head of each caricature. Gates then narrates for the viewer through voiceover: Shriver "is currently exploring the relationship between [genetic] admixture and our physical features. Now this may sound a lot like the old idea that our hair, our eyes, and our skin color suggest that different groups of people evolved separately, and that some people are physically and intellectually superior to other people, but Dr. Shriver is quick to refute this." The film then cuts to Shriver giving a lecture to his Penn State students, with Gates sitting among them. Shriver, who identifies as white, shares that his own "racial" admixture is 11 percent African. Gates, in his usual jocular fashion, then raises his hand to ask Shriver how his mother took the news. This scene suggests that Shriver's "refutation" of the old racial thinking happens simply because he shares DNA with present-day Africans. The idea is that "race" as genetic ancestry allows for sharing and inclusion as sources of belonging—but also of entertainment. On the surface, this possibility quickly trumps the serious violence of hierarchical exclusion and racial hatred of the past. This program of *African American Lives*, as well as *African American Lives 2*, aired during February for Black History Month.

CONCLUDING THOUGHTS

Race thinking in science is still with us today, despite a few brief retreats as recently as the year 2000. Increasingly, the use of race in certain geneticists' circles can be seen as acceptable on several registers. Scientists who organize studies by race, even if they prefer the euphemism "continental genetic ancestry," now hope to include racial minorities in projects with social justice and real capital effects.[23] There is a movement where policy makers and scientists who could be classed as political liberals and conservatives come together and join forces to advocate for the inclusion of race as a variable in genetic studies. Still, the organization of protocols by race too often reduces biological outcomes that have social origins to genetic explanations.[24] This dynamic has a power effect that makes it harder to pinpoint where the pernicious aspect of race in science starts or stops. In the present, the potential for racism is often embedded in good intentions. For instance, in the early 2000s proponents of racially tailored pharmaceuticals framed them as at last offering needed medical attention to historically abused and neglected groups. They even borrowed from humanitarian discourses of service delivery to the poor.[25] The gross simplification of human population and individual origins by direct-to-consumer ancestry testing companies shows how profit is joined with scientists' projects to somehow restore to people the histories lost to them through slavery and other forms of dispossession. Massive recruitment of minorities into genetic databases is framed as the claim that "they too" need to be counted in the genetic revolution.[26] Teaching

[23] One clear example is the direct-to-consumer genetic testing company 23&Me's "Roots into the Future" project. For an analysis see Sandra Lee, "Race, Risk, and Recreation in Personal Genomics: The Limits of Play," *Medical Anthropology Quarterly*, 2013, *27*:550–569.

[24] See Jonathan Kahn's discussion of the first racialized pharmaceutical, BiDil, in *Race in a Bottle* (New York: Columbia Univ. Press, 2012). See also Duana Fullwiley, "The Molecularization of Race and Institutions of Difference: Pharmacy and Public Science after the Genome," in *Revisiting Race in a Genomic Age*, ed. B. A. Koenig, S. S. Lee, and S. Richardson (Studies in Medical Anthropology) (New Brunswick, N.J.: Rutgers Univ. Press, 2008), pp. 149–171; Fullwiley, "Biologistical Construction of Race" (cit. n. 8); and Dorothy Roberts, *Fatal Invention: How Science, Politics, and Big Business Re-create Race in the Twenty-First Century* (New York: New Press, 2012).

[25] See Kahn, *Race in a Bottle*, p. 98, where proponents of BiDil likened African-American heart failure to an "orphan" disease in order to frame its FDA approval as ethically and politically necessary.

[26] Bustamante *et al.*, "Genomics for the World" (cit. n. 5).

tools to drive home multicultural societal acceptance of difference have also provided the genetic materials to build databases that will assist in forensic racial profiling of DNA left at crime scenes. Because of extant, well-documented racial bias throughout the criminal justice system, we should be concerned that molecular photofitting is now being developed largely with black people's samples.

Until early in 2014, less conspicuous were projects that overtly "rank human groups, and . . . measure them negatively against an idealised, romanticized picture" of Europeans outlined by Stepan.[27] In May 2014, however, Nicholas Wade, the recently retired senior science writer for the *New York Times*, published *A Troublesome Inheritance: Genes, Race, and Human History*. In it he makes the case that Western culture and so, by extension, people of European descent are better adapted, or more "evolved," than others, especially Africans. His racial hierarchy is bolstered by economic examples in which poverty can only mean maladapted genes. Wade nearly always puts the world's black people at the bottom of the hierarchy, writing: "Many countries with no resources, like Japan or Singapore, are very rich, while richly endowed countries like Nigeria tend to be quite poor. Iceland, covered mostly in glaciers and frigid deserts, might seem less favorably situated than Haiti, but Icelanders are wealthy and Haitians are beset by persistent poverty and corruption." Although Wade admits that much of the book is "speculative," the first part builds its case by reviewing current genomic studies in which population differences are framed in continental racial terms through technologies like AIMs. Wade writes: "Analysis of genomes from around the world establishes that there is indeed a biological reality to race . . . an illustration of the point is the fact that with mixed-race populations, such as African Americans, geneticists can now track along an individual's genome and assign each segment to an African or European ancestor, an exercise that would be impossible if race did not have some basis in biological reality."[28] He also cites forensic efforts based on AIMs technology (and digital mugshots) to determine a suspect's race with "80 percent accuracy" as proof that genetic races exist. Within two weeks of its publication date the book was supported by a flurry of reviews, starting with a prepublication review by Charles Murray, coauthor of *The Bell Curve*, in the *Wall Street Journal*. Prepublication critiques began with a Webinar hosted by the anthropologist Augustín Fuentes and the American Anthropological Association.

This is the contemporary moment. Scholars of race in science must detail it meticulously in order to begin to chronicle the continuities that allow for so much active change that has ushered in a progressive, renewed acceptance of biological ideas of race that are often deployed for antiracist efforts. At the same time, works like Wade's have reinvigorated quite racist assumptions about human capacities. Yet here, too, the prominent science reporter is desperate to come off as a reasoned nonracist, while many of the bloggers, journalists, and scientists who wrote the initial flood of positive reviews supporting him have branded themselves not as racist but as concerned with "Human Biodiversity." (They call their community affiliation "HBD.")[29] In this cultural landscape where we now find ourselves, the complex realities of human population differences are too easily conceptually synthesized with genetically

[27] Stepan, *Idea of Race in Science* (cit. n. 1), p. 189.

[28] Nicholas Wade, *A Troublesome Inheritance: Genes, Race, and Human History* (New York: Penguin, 2014), pp. 13, 4.

[29] See Nathanial Comfort, "Genetics under the Skin," *Nature*, 2014, *513*:306–307.

based notions of race—despite new advances in genomics. These ideas are finding appeal with people regardless of where they sit on the political spectrum. As such, an acceptance of race as genetic is becoming ever more entrenched in medicine, law, science education, genomic research, and personal identity. At the same time, it is potentially reconfiguring notions of racial justice and political inclusion—as well as exclusion—more broadly.