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Identity and genetic ancestry tracing

Carl Elliott, Paul Brodwin

Tracing genetic identity can lead to resolution of uncertainty but can cause more problems than it solves. Will establishment of genetic identity be cohesive or divisive?

What can our genes tell us about who we are? The answer to that question depends on exactly what you want to know. In 1997, a Virginia pathologist and his colleagues used Y chromosome testing to corroborate (and in another case, fail to corroborate) the claims of families of African-Americans who believed themselves to be the descendants of Thomas Jefferson and his slave mistress, Sally Hemings.¹ Researchers have used genetic testing to uncover evidence of genetic markers in the Lemba, a black southern African tribe whose oral history and customs have long suggested Jewish ancestry.²⁻⁴ In June 2002, the results of a genetic ancestry study were announced to a gathering of Melungeons,⁵ a “mixed ancestry” group in eastern Tennessee and Virginia⁶ whose ethnic origins have been clouded in mystery for centuries.⁷

Genetic ancestry tracing is not a purely academic exercise. A geneticist at Howard University has announced plans to offer commercial genetic ancestry tracing to African-Americans who want to trace their genetic lineage back to the areas of Africa from which their ancestors were captured and brought to America as slaves.⁸ The past few years have also seen the emergence of several commercial genetic testing ventures offering fee-for-service paternity testing, tests for evidence of Jewish ancestry, native American ancestry, or, in the case of Oxford Ancestors, a genetic connection to one of the so called “seven daughters of Eve.”⁹

Role of ancestry in identity

What should we make of these developments? Well before the advent of molecular genetics, the calculation



Fig 1 Confederate soldier, Vardy Collins, a Melungeon listed on an 1830 census as a “free person of colour”

Summary points

Genetic ancestry tracing is being used to decide claims about ethnic, political, familial, and religious identity

While genetic ancestry tracing is becoming increasingly popular, its limitations make the information it reveals subject to misinterpretation

The information about identity revealed by genetics must be weighed against other determinants of identity such as cultural determinants and historical narratives

of ancestry played an important and controversial part in political identity, as in the “one drop rule” in the Jim Crow South, in which one drop of Negro blood disqualified a person from the legal privileges associated with being white. Even today, determinations of ancestry or “blood” affect citizenship rights throughout the world; the right of return of displaced people; membership in tribal bands of aboriginal people in north America; and affirmative action eligibility (social programmes intended to reduce social and sexual discrimination) in the United States. Determining one’s ancestry through genetic evidence would fundamentally transform these types of political identity. But political identity is not the only form of identity in which genetics can play a potent part. Genetics can affect questions of ethnic identity (such as who counts as Cherokee or Maori), religious identity (who counts as Parsee or Jewish), family identity (who counts as a descendant of Thomas Jefferson), or caste (who counts as Brahman or Dalit).¹⁰ These identities overlap in various ways, and genetic evidence will not affect them all equally. But clearly confusion looms when genetic markers conflict with other kinds of markers of group membership, such as a shared culture or historical narrative. Does it make you any more English, or Sioux, or Jefferson if your identity has been corroborated by a genetic marker?¹¹

Such questions are complicated still further by the limitations of the genetic technology. Two main techniques are currently being used: mapping polymorphisms on the Y chromosome to trace paternal ancestry and on mitochondrial DNA to trace maternal lines.^{12 13} Both techniques take advantage of the fact that some genetic material is passed down unchanged from parent to child—in the case of the Y chromosome, from father to son; and in the case of mitochondrial DNA, from mother to child (both male and female). The problem is that mapping Y chromosome and mitochondrial DNA polymorphisms will trace only two genetic lines on a family tree in which

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Fig 2 Wilbert Cudjoe, who, because he has less than one eighth Seminole blood, has been denied the ancestry he claims

branches double with each preceding generation. For example, Y chromosome tracing will connect a man to his father but not to his mother, and it will connect him to only one of his four grandparents: his paternal grandfather. In the same way, it will connect him to one of his eight great grandparents and one of his 16 great great grandparents. Continue back in this manner for 14 generations and the man will be still be connected to only one ancestor in that generation. The test will not connect him to any of the other 16 383 ancestors in that generation to whom he is also related in equal measure.

This may sound like a slender thread on which to hang an identity. Yet identities have hung on far more slender genetic threads than this. Just as it once took only a single genetic line to disqualify a person from being counted as white in the American south, today it takes only a single genetic line to connect a person to the British Royal Family, to get him or her a German passport, or to qualify him or her as a member of the Jewish Cohanim. Two years ago, after a bitter monetary dispute, the Seminole Nation of Oklahoma passed a resolution that will effectively expel most black Seminoles, or Seminole Freedmen.¹⁴ The Freedmen are the descendants of former slaves who fought alongside the Seminoles in the Seminole Wars and who have been officially recognised as members of the Seminole Nation of Oklahoma since 1866. The new constitution says that to be part of the tribe, a person must show that he or she has one eighth Seminole blood.¹⁵

Many observers worry that this new genetic information will be given too much authority in deciding questions about identity. Media accounts have often treated tracing of genetic ancestry as the final answer to extremely controversial questions—as if genetic tests had authoritatively settled the question of whether the Lemba are really Jewish or the question of from what African tribe can an individual African-American legitimately claim descent.¹⁶ Yet the actual answers to these questions are far more complex.

Genetics versus history

One general point of controversy turns on the question, who gets to decide who is a member of the group? For example, many Lemba maintain that they are Jewish, and the genetic studies bolster their case. By what do other Jews say? The question of who counts as

Jewish has a long history with a complex set of rules. The rules passed down by the Lemba over generations may well differ from those of other Jewish populations, and it is not immediately obvious which group gets to decide who counts as “really” Jewish. (This question would become even more pressing if a Lemba were to apply for Israeli citizenship.¹⁷) Similar difficulties arise with the question of who counts as a native American. The US federal government has one set of rules, enshrined in law, and individual native American tribes have others. Genetics (or “blood quantum”) has one role in one set of rules and another quite different role in others.^{18 19} Whose rules should take priority?

Another point of controversy turns on the relative priority given to genetics as opposed to other accounts of identity. For the Lemba, it has been a matter of happy circumstance that Y chromosome studies have tended to corroborate their oral history of Jewish ancestry. The tests might have turned out otherwise, and if they had, which account should be believed, the one told by genetics or the one told by the Lemba? Similar questions arise for individual genetic ancestry tracing. What if you have always been told that your ancestry is Scottish but genetic tests indicate that your Y chromosome traces back to Nigeria?

In the bitterly contested case of Thomas Jefferson’s descendants, many outside observers simply treated genetic testing as the final arbiter of kinship. Those tests corroborated the ancestry claims of the descendants of Eston Hemings, but they failed to do so for the descendants of Thomas Woodson, another of Sally Hemings’ children who was said to be Jefferson’s illegitimate son. Yet it is not entirely obvious that genetics should be treated as the final answer to claims of kinship. Most ordinary kinship claims are not subjected to the rigours of genetic testing. How many cases of false paternity and adoption would emerge if they were? It is also possible to imagine genetic tests contradicted by historical evidence. Suppose, for example, that evidence were to emerge indicating that Thomas Jefferson himself believed that Thomas Woodson was his son and treated him as such. Might not this change the way we looked at his family’s ancestry claims?

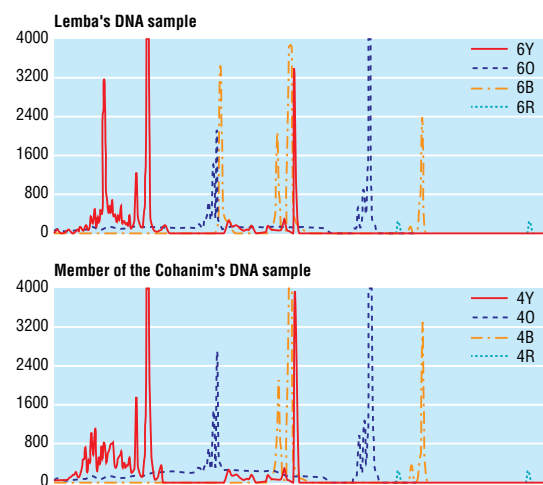


Fig 3 DNA analysis of genetic samples from a member of the Lemba tribe and a Cohanim

Science or hobby

Perhaps genetic ancestry tracing will evolve into little more than a popular hobby, like internet genealogy. Yet it is also possible that as it becomes more reliable, genetic ancestry tracing will be embraced by the courts, the media, and various political institutions as the most authoritative measure of identity. This outcome may be even more likely if more groups, encouraged by the stories of the Lemba and the Hemings family, decide to put their own narratives to the genetic test—to see if genetic ancestry tracing can confirm their own origin story, their family history, or their claims to group membership. It is worth remembering that genetic ancestry tracing has the potential to disrupt identity claims as well as to corroborate them. Given the imprimitur of science carried by genetics, those disruptions may be hard to repair.

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The devil in the test tube

He was thin and weak, and his voice was almost inaudible despite the relative quiet of a teaching hospital side room. By the time I joined the firm as a student, he had endured a fever of unknown origin for over a month. Allocating him to me, the house officer had explained that his hairy cell leukaemia should be curable were it not that the source of his fever remained stubbornly elusive. Instead, he lay drained, submitting to repeated blood cultures and increasingly invasive investigations.

After retiring as a schoolmaster, he had trained as a missionary and travelled widely. All manner of latent exotic infections might be coming back to haunt him, but all the test results were negative. Finding a good vein for the blood samples became difficult, and I tried optimistically to explain each new investigation. We exhausting this bit of game playing after a while, and we moved on to the new direction in his work. Being single and used to teaching boys, he seemed to find the daily attention of a female student novel, and I sensed him applying his mind to me, summing up my performance and potential.

Living far from London, he had few visitors, which may have been a mixed blessing. He recounted a visit by one of his younger, more evangelical colleagues: "Do you know, he suggested that the Devil may be here—somewhere in my illness." With sardonic glee he recalled his retort: "Well if the Devil is here, he's at the bottom of a test tube now."

But it was an effort for him to talk, his voice so low that I could not always catch what he said, and sometimes he would collapse back on to the bed trying to hide his exasperation. Once he did ask, "Are you sure your hearing is all right?"

"Oh yes," I replied, "my friends sometimes ask, but my GP says I should pay more attention."

The weeks passed, and so did Christmas, though no positive results arrived. He was weaker, his pyjamas

flapped around him, and his watch was broken. On the morning of Christmas Eve he gave me money to buy a replacement. He was so overwhelmed by the structure this brought back to his days, he offered me money as a present. "No," I said, putting him off, "buy me a book on theology when you are better."

In the New Year I moved to another firm and visited him less often. But I learnt from the house officer that someone had reviewed the original bone marrow aspirate and spotted atypical mycobacteria. I found my patient cheerfully contemplating the diagnostic puzzle. "Isn't it interesting?" he mused. "It was there all the time, we just couldn't see it."

He started receiving treatment, and my visits dropped off. Some six months later, I met him by chance in the outpatients' clinic—stronger, upright, and sporting a beard. I was so surprised, my words came out unchecked. "What's happened to you?" I demanded.

"I've got better," he pronounced, lifting his stick and heading off for his appointment. I quite forgot to report that he had prompted me to go back to my general practitioner and ask for some hearing tests. These had revealed a low frequency hearing loss. Weak patients and mumbling consultants are simply outside my range.

I never did get the book on theology, but two devils had indeed been found out.

Elizabeth Davies *specialist registrar in public health, London*

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