



# i, where im from

Mark Shriver can change the way  
you think about your ancestry.  
And all he needs are a few of your cells.

I was halfway through my sixth pint of Guinness at a small, out-of-the-way pub in midtown Manhattan three years ago when I began to take on a very conspicuous brogue. “Your friend seems to have turned Irish,” the Belfast-born bartender told my companion, who was looking increasingly wary. In different circumstances, I may have been lucky to leave with my teeth intact, but the bartender and the owner seemed to be enjoying my futile attempt to return to my roots. “I’m more Fenian than the lot of ya,” I claimed. We didn’t stay long after that. ∞ My claim was far from true. Technically, I’m about a quarter Irish, thanks to my grandmother on my mom’s side. But I

By Dan Morrell

always felt a bit more Irish than that. I spent a summer studying in Galway, rooted for the Irish national soccer team, even looked down on those ignorant fools who were Irish for a day in March.

The truth is that I am as much Bohemian as I am Irish. “Twenty-five percent Bohemian, 25 percent Irish, 12.5 percent Italian, 12.5 percent Polish, 12.5 percent French, 12.5 percent English/German,” is what I write on the forms I fill out in Penn State faculty member Mark Shriver’s office one day last summer. “Real Bohemian, not hippie Bohemian,” Shriver jokingly clarifies as he reviews the forms and hands me a Q-Tip for a swab of the inside of my cheek. His boyish looks and cargo shorts are not what I had expected. He seems too young, too casual to be the kind of guy who has published papers in such serious journals as *The Annals of Internal Medicine* and *Human Genomics*. I scrape the interior of my cheek and hand the Q-Tip to Shriver, who packs up the cotton swab in a plastic bag to be shipped off to Sarasota, Fla., for analysis.

Shriver, in addition to being an associate professor of anthropology at the University, is a consultant for DNAPrint, a small gene-research firm in southwest Florida. DNAPrint is becoming a one-stop shop for consumers’ chromosome-mapping needs: The test I took was AncestryByDNA, the firm’s genealogy assessment, but the company’s product line also includes paternity tests, tests that suggest how you will respond to different medications based on your genetic makeup, and a test called DNAWitness. The latter product has been used by criminal investigators to help narrow the hunt for suspects. Two years ago, for example, in the case of the Baton Rouge Serial Killer, a DNAWitness analysis of evidence collected from various crime scenes showed Louisiana authorities that they shouldn’t be on the lookout for the white male they had been searching for—the killer’s DNA showed a man who was about 85% sub-Saharan African and 15% Native American. Derrick Todd Lee, an African-American, was arrested about two months later. So far he has been convicted of two murders and tied to five others, thanks in large part to a DNA sample he provided to investigators.

Eventually, Shriver figures, advances in DNA research could lead to the ability to construct a complete three-dimensional image of a person based only on a tiny sample of DNA. Any strand of hair, flake of skin, or drop of saliva could be transformed into a composite sketch of its owner, complete with hair color, skin color, eye color, and height. Imagine if the



► **CRIME FIGHTER:** Mark Shriver’s next study aims to find what parts of our DNA influence facial characteristics. The results of his research could offer a boon to criminal investigations all over the world.

police could provide full-color, true-to-life mug shots of suspects just hours after the crime.

But beyond DNAPrint’s applications in the fields of genealogy and criminology, Shriver is driven by a different quest. “I’m more interested in the biomedical applications of what we have here”—more specifically, the potential to prevent disease.

Different populations suffer specific diseases more frequently than others: People of West African descent are much more likely to be afflicted with sickle-cell anemia, for instance, and those with European ancestors are more likely to contract skin cancer and cystic fibrosis. Knowing more about your ethnic origins could at least help you be aware of your risk for such diseases. If geneticists are eventually able to determine that certain genes—in addition to or in combination with particular environmental factors—are the best predictors of some diseases, medicine could be transformed into a series of pre-emptive strikes against disease that could begin well before birth. “Maybe, in the end, there will be some way to use those predictions of which genes increase your risk to help diagnose or treat a person—or a population,” says Shriver.

That end could be in the near future, says Lisa

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Brooks, director of the genetic variation program at the National Human Genome Research Institute, a group that has funded some of Shriver's research. "In five to 10 years—certainly within 20 years—there will be a lot more information about which [specific genetic] variants contribute to what disease," she predicts.

To translate this into lay terms: In a couple of decades, it might be possible to predict your death before you're even born.

**H**uman beings are 99.9 percent identical, genetically speaking, but within that 0.1 percent, there are sections of DNA in our chromosomes called genetic markers that vary greatly among individuals. They are the reason that people can appear so different from each other, be it blue eyes or brown, short or tall, black or white.

After Shriver joined DNAPrint as a paid consultant in 2001, he and his colleagues there gathered 30,000 of these genetic markers from The SNP Consortium, a giant, publicly accessible database of genetic readings collected from all over the world. (SNP stands for Single Nucleotide Polymorphisms—the molecules that form one-half of those rungs on DNA's double-helix ladder and cause about 90 percent of all genetic variation.) The team then separated the markers by their regions of origin—East Asian, West African, European, and Native American—and looked for commonalities in SNPs among the samples from each region. Native Americans, for instance, may be more likely to have a G (for guanine) at a rung where other populations have a C (for cytosine); Europeans may typically show an A (adenine) at a rung where other populations have a T (thymine). With these genetic models, Shriver and DNAPrint could measure a given DNA sample against the models and draw conclusions about the person's ancestry. The AncestryByDNA test was born.

Last year, Shriver began offering AncestryByDNA

tests to volunteers in Samuel Richards' Sociology 119 (Race and Ethnic Relations) course at Penn State. Students were often surprised by the results, according to a story in *The New York Times* in April. Two students who considered themselves black were shocked to find high percentages of European ancestry in their test results. Others were hoping for a surprise: "Everyone wants to take the test, even students who think they are 100 percent one race or another," Richards told the *Times*, "and almost every one of them wants to discover something, that they're 1 percent Asian or something. It's a badge in this multicultural world."

Columbia University law professor Patricia Williams read that article and envisioned a future where genetic percentages determine the social order and define who will be granted the "privileges of whiteness." Williams, a columnist for *The Nation* magazine, cautioned: "Let us not mistake [this] for anything like progress."

Shriver calls Williams' analysis "extreme," noting that the factors that determine privilege—like wealth and professional status—are determined in large part by our parents and grandparents, and by whatever privileges *they* were or were not extended. And Shriver doesn't think the effects of racial discrimination against African-Americans will simply disappear if they discover they have European ancestry. "These things don't just go away," says Shriver.

Williams' column also noted her "concern about the commercial competition for 'race-specific' medicines," a concern she shares with ethicists who have taken issue with a new heart failure drug, BiDil. The drug failed to gain Federal Drug Administration approval in 1997 as a treatment for the general population but was reconsidered and approved by the FDA this past June in its revised form: a heart failure drug for African-Americans only. The new FDA decision took into consideration evidence from a study in which 1,050 African-American heart failure patients were

treated with BiDil. Researchers in that study reported a 43 percent reduction in the death rate.

But such drugs would “give an official ring to the discredited idea that race is a biological category,” Jonathan Kahn, a medical ethicist at Hamline University law school in St. Paul, Minn., told *The New York Times*. In other words, Kahn thinks drugs like BiDil may make people begin to think that different skin colors represent some great divide in terms of how we are built.

Shriver admits that a “Drugs for Blacks” headline, on its own, could lead to some ill-conceived ideas about race and genetics. “There is some explanation required here,” says Shriver. Skin color alone, he says, tells you very little about a person’s genetic makeup, and therefore how much that person is at risk for certain diseases. Shriver has seen many African-Americans who have shown more European ancestry than African ancestry, and the variation in genetic markers among African-Americans is higher than it is in the

## DNA in the News

The science of DNA is a fairly new one. It was relatively unknown until 1953, when Watson and Crick unveiled their double-helix model of DNA, but has gained mass attention in recent years for its uses in medicine and criminology. Here is a sampling of the major headlines and breakthroughs over the past two decades:

- ▶ **1984:** University of Leicester professors Alec Jeffreys and Vicky Wilson discover that variants in DNA could be used as “digital fingerprints.” Two years later, Jeffreys provides the first-ever use of DNA as evidence in a double rape and murder trial, clearing one of the men in custody.
- ▶ **1987:** DNA evidence survives one of its first major challenges when, during the pretrial hearings in *New York v. Castro*, the New York Supreme Court ruled that DNA identification could be admissible in court.
- ▶ **1989:** The Virginia Supreme Court upholds the murder and rape convictions of Wilson Spencer, who had been convict-



▶ **INNOCENT:** Ronald Cotton and former accuser Jennifer Thompson in 2000, five years after Cotton was exonerated of rape charges by DNA evidence.

ed earlier using DNA evidence to tie him to the crime.

- ▶ **1993:** Kary Mullis is awarded the Nobel Prize in Chemistry for his work with the polymerase chain reaction (PCR), which allows scientists to artificially replicate DNA. This process is key to DNAPrint’s work, as the PCR allows them to amplify each sample by replicating it many times over to ensure a more accurate reading.
- ▶ **1996:** The National Institute of Justice releases a report titled *Convicted by Juries, Exonerated by Science*, which notes 28 cases where those convicted of crimes were subsequently released based on DNA evidence. One of the most famous cases was that of Ronald Cotton, a North Carolina native who had already served 10 years of a life sentence for two rape convictions until DNA tests exonerated him. He was released from jail in 1995.
- ▶ **1997:** Researchers at the Human Genome Project announce that they have discovered the gene responsible for at least one type of Parkinson’s disease.
- ▶ **2000:** President Clinton and representatives from the Human Genome Project and Celera, a private company, announce the completion of a working draft of the human genome at a June press conference.
- ▶ **2003:** The first endangered species—the banteng species of wild cattle—is cloned in an effort to stave off extinction.

three other groups. “To think that by identifying them as black, that you’ve said something about their underlying genetic composition, is just kind of silly,” Shriver says. “That said, I’m not totally opposed to this kind of [medical treatment]—I don’t think it’s so risky that it is useless. To say that science has to be perfect before we move ahead and allow a product to be marketed is a bit extreme.”

**A** few weeks after my cells have been shipped to Florida, my test results arrive at my office. I open the package from DNAPrint without expecting any revelation. And yet, there it is: 12% East Asian.

What’s this? A long-hidden family secret? A mix-up at the chromosome clinic? The answer, it turns out, is much more logical. “It’s Poland,” says Shriver when I call him, referring to the fact that, genealogically, I’m about 12.5% Polish, via my grandfather on my father’s side. “But one of the things about these markers is that you shouldn’t overinterpret the labels we give them,” Shriver says. While we typically think of “East Asia” as meaning China and Japan, he explains, many people over the centuries have migrated from Central Asia into both East Asia and Poland. Turns out, I do share a genetic structure similar to someone in Tokyo, because both of us can be traced back to a population that originated in Central Asia, the area that includes Kazakhstan and Uzbekistan.

But really, telling me I’m 12% East Asian raises as many questions as it answers. As Shriver describes, my East Asian roots could have come from anywhere from Bucharest to Beijing. And that’s not to mention how much variation there could be in my 88% European results. Just looking at my test results, Shriver says I bear a striking genetic resemblance to descendants of the Ashkenazim, or Eastern European Jews.

While my test was strictly for my own interest, for many Native Americans, tests of DNA—along with documentary proof of a familial link to a tribe—can play a huge role in determining tribal membership and any benefits that come with it. In June, the DNA testing service Orchid Cellmark announced that it would be supplying genetic testing to the Enoch Cree Nation in Alberta, Canada, for the tribe’s membership application process. The announcement came a little over a year after the group was approved to build a \$127 million casino on the western

edge of Edmonton—with all of the revenue to be split among the members of the tribe.

In Connecticut, members of Mashantucket Pequot tribe—owners and operators of the 4.7-million square-foot Foxwoods Casino resort—have also considered using DNA technology to prove tribal connections that could entitle members to lucrative revenue-sharing payments: \$10,000 per person per month. However, DNA tests may mean very little without a consideration of your family tree. “Just simple belief in a test without considering all the other data is, you know, foolish,” Shriver told the Reuters news service. “The science is not simply true and objective, but has to be considered in the context of other information.”

As in the case of my Eastern Asian roots, individuals can show genetic similarities to Native Americans without being a descendant of a modern tribe. Because Native Americans most likely emigrated from Central Asia between 15,000 and 30,000 years ago—with some going west to Europe and others going east across the Bering Strait and into the Americas—you can find traces of Native American DNA in people with Eastern European heritage. Even my own results showed a few possible, albeit minor, links to Native Americans.

**S**hriver has just begun a 10-year Penn State study, funded in part by DNAPrint, of genes and how they determine phenotypes—that is, hair color, eye color, and other physical ways that genes express themselves. He and his grad students have begun swabbing cheek cells, taking blood samples, and snapping 3-D photos of the faces of volunteers. This information will allow Shriver to start figuring out what portions of our genes code for such phenotypes as bushy eyebrows, high cheekbones, and square jaws. Perhaps by 2015, when Shriver hopes to wrap up his study, law enforcement will have a new tool that will give instant access to the faces behind the crimes, cutting down the chances that killers like Derrick Todd Lee will be able to strike twice in the future. And maybe by 2015, Shriver’s research into genetic ancestry will have proven to be a springboard for global disease-prevention methods and awareness campaigns.

Me, I’ll still be hung up on the past. Like six months ago, when I used to be Irish. 