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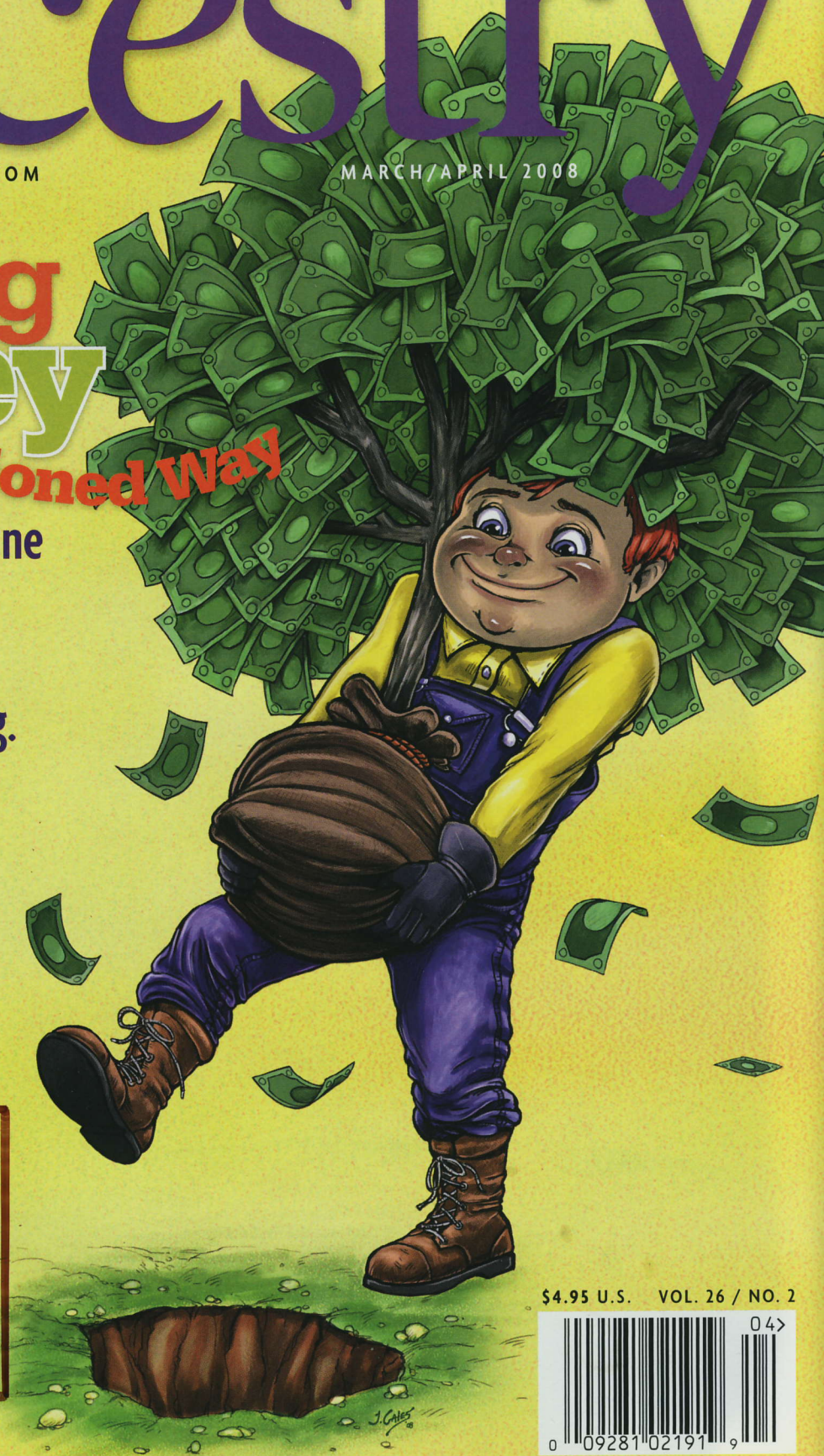
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Is DNA Making Us More Alike ...or Different?

Taking DNA beyond simple lineage.



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BY JON ENTINE

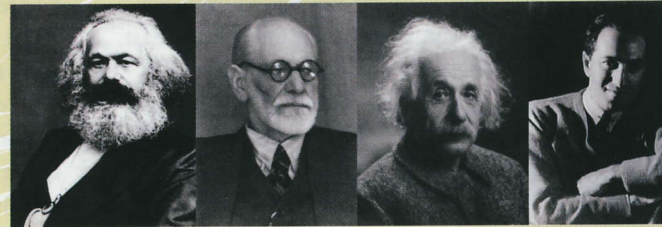
SEVEN YEARS AGO, I RECEIVED a horrific call from my sister, who was then 54. She had noticed a lump in her breast. It was diagnosed as a rare form of cancer known as BRCA2, or BReast CAncer 2 mutation 6174delT, one of three breast and ovarian mutations that prominently target Jews or descendants of Jews.

My sister has survived her travail, but the long-term prognosis is mixed. It's estimated that one in 43 Jews (about 2.3 percent), women and men, carries one of these three gene faults. My mother, grandmother, and aunt all died nearly 30 years ago of mysterious cancers. Our family tree disappears into the 19th century eastern European Diaspora, so it's difficult to trace the history of these

DNA ABOLISHING

differences

OR EMBRACING THEM?



wayward genes. Were we the victims of bad luck? Or bad DNA?

We've all heard the phrase, "We are, regardless of race, 99 percent the same." The inclination even by some scientists to highlight the threads that bind together the world's diverse populations and to underplay our uniqueness is certainly understandable. But it's also misleading.

Jews and Ancestry

The romance of the egg and sperm ensures that we not only differ as individuals but as groups. Science is moving out of the kumbaya phase of genetic variation—the 99 percent factoid—to the reality that humans have evolved in populations, almost like pack animals, over the course of history.

Although geneticists generally avoid using the term "racial" to characterize population differences, ances-

try does matter. Because modern humans move around and fool around far more expeditiously than their ancient ancestors, modern "races" and ethnic groups are fuzzy at the edges.

As a rule, the more historically isolated a population—because of geographical or cultural barriers—the more distinct its genetic makeup. Clues about the origin of diseases have prompted researchers to focus on a number of geographically isolated groups: Icelanders, Finns, indigenous Ainu of Japan, American Indians, Costa Ricans, Maori of New Zealand, Sardinians, Basques, rural Chinese, and various West African tribes and their descendants, are examples. Known as founder populations because they tend to preserve the genetic makeup of the founders, these groups have two key attributes: only a few thousand primary ancestors and little intermarriage in succeeding generations. Other genetic islands have been shaped by strong religious

and cultural beliefs—gypsies; the kindred clans of Mennonites, Amish, and Hutterites; and Parsis. But no gene pool has been more crucial for DNA research and the quest to develop medical cures than the Diaspora communities of the Jews.

The number of Jews worldwide is thought to be about 13–15 million, although estimates are hazy because of the complex notion of Jewish identity. There are only a few million Mizrahim (also known as “Oriental Jews”)—those descended from Jewish communities in the Middle East. There are a few million more Sep-

hardim (from the Hebrew word *Sefarad*, meaning “Spain”), who trace their ancestry to Iberia or North Africa, the center of Diaspora Jewry until the medieval Inquisitions. Approxi-



mately 10 million Jews (5.5 million in the United States) are Ashkenazim, a word derived from the Hebrew word for “German,” which suggests recent European roots.

Who Is a Jew?

Scientists study group genetic variation because it offers keys to understanding the origins of diseases—the real focus of human genome research. The fact that scientists now acknowledge group-to-group differences shouldn’t be seen as resurrecting problematic racial theories. But it does mean we need a vocabulary to discuss human differences. This is particularly important to Ashkenazi Jews, who are at the center of this debate.

This is prickly stuff. After all, Jews (and other minorities) have paid a heavy price throughout history for being considered a race. “Race” is considered a taboo concept in this politically correct era. But for those of us interested in genetics and revelations that have emerged from Haplotype Map (HapMap) research, it must be addressed.

The notion of race is also embedded in the politics of the Middle East, where one of the key issues is the so-called “right of return”—the belief that Jews have spiritual claim to Israel. A walk through the geopolitical hazard zone known as the Internet unearths a number of websites challenging the premise of the Jewish right of return. They claim, rightfully, that most Palestinians can trace their ancestry back to ancient Palestine. But many of Israel’s fiercest critics also claim, dubiously, that most modern Jews—Ashkenazim—have no ancestral links to ancient Israel.

What Does the DNA say?

What are the ancestral origins of Ashkenazi Jews? Using a DNA testing service, I discovered that my own Y-chromosome, which has remained unchanged from generation to generation except for the accumulation of DNA mistakes, is haplogroup R1a. That probably marks me as a descendant of the Khazars, making my male lineage not Semitic but Eurasian.

DNA has the potential to bring people into larger ancestral pools. But there’s a flip side, too: those same DNA tests emphasize differences. For family historians, the good and bad of that fact are just beginning to be realized.

What About Women?

The maternal Ashkenazi lineage is more complicated and still to be fully unraveled. Israeli geneticist Doron Behar found that about 4 million of today’s Ashkenazi Jews—about 40 percent of Jews originating in Central and Eastern Europe—descend from just four women, probably the “founding mothers” of four large medieval Jewish villages. But many of the other founding mothers of Ashkenazi Jewry do not appear to have Semitic roots. “The Jewish men appear to have established small, scattered Jewish villages in Europe, probably with local women,” says Duke University geneticist David Goldstein. “But once the [local Ashkenazi] communities were founded, the barriers went up,” slamming their doors shut to new converts. They subsequently raised their children as Jews.



According to David Goldstein, a Duke University geneticist and a key researcher in population studies, most of the male founders of European Jewry were probably Jewish traders or money lenders who came to the area without spouses. They mixed with local pagans and probably saw an infusion of some Khazarian royalty when the empire crumbled.

Based on male and female DNA evidence, over the past 1,000 years or so, the Jews and gentiles that made up the founding families of Ashkenazi Jewry adopted a very strong Jewish identity. They remained fiercely insular and married within their community. Conversion, while allowed, was difficult.

The closed nature of their society has left a deep genetic footprint. University of Arizona geneticist and Y-chromosomal expert Michael Hammer estimates that the rate of non-Jews who entered the European Jewish gene pool over the past centuries was less than 0.5 percent per generation, at least until recent decades. As a result, Ashkenazim are considered one of the world's most distinctive populations (a term scientists use rather than the folkloric notion of "race"). That's made them a favorite of population geneticists—and a gold mine of data for DNA testing companies. It also helps explain why there are more than 40 diseases that are common to Jews and why major testing companies are beginning to roll out "ethnic panels" that focus on the behavioral and disease idiosyncrasies of distinctive populations.

For Me

DNA is at once an atlas and time machine that can transport us to Biblical times and beyond, awakening us to the shared roots of civilization

and the promise of designer therapies to target disease. We are on the verge of expanding this tracking process beyond our male and female lineages to the entire human genome, which would give us a far more complete picture of the ethnic threads woven by nature to create each of us. The great paradox of human biodiversity research is that the only way to understand how similar humans are is to learn how we differ. That includes me.

After my sister's diagnosis, I had myself tested and was found to carry the same mutation that my sister carries. Its effects on men include a slight risk of breast cancer and an increased possibility of melanoma of the eye. But more frightening, my daughter, who is a product of a mixed Christian-Jewish marriage, has a 50/50 chance of carrying this gene fault; if she does, the probability that she will eventually contract cancer is estimated to be as high as 80 percent.

It wasn't surprising that in its end-of-the-year issue, *Science* magazine named "human genetic variation" (www.sciencemag.org/cgi/content/full/sci;318/5858/1842) as the scientific breakthrough of 2007—we each carry pinpoints of DNA that suggest that maybe human population groups aren't really quite so alike. However slight our genetic differences may be, they are defining. They contain the map of our family trees back to the first modern humans. They catalog our vulnerability for many diseases. And they mark me indelibly as a Jew.

JON ENTINE is author of *Abraham's Children: Race, Identity and the DNA of the Chosen People* (www.abrahamschildren.net), and can be contacted via his website, <www.jonentine.com>.

Is Race a Step Backward?

The acknowledgment of identifiable human races and ethnic groups, including Jews, is not an endorsement of simplistic racist stereotyping. Those of us, scientists included, who have long endorsed the orthodoxy that racial differences are "skin deep" are having a difficult time adjusting to this new and provocative—but ultimately informative and sensible—reality. "Race is merely a shorthand to enable us to speak sensibly, though with no great precision, about genetic rather than cultural or political differences," notes Armand Marie Leroi, respected evolutionary developmental biologist at Imperial College in London. "But it is a shorthand that seems to be needed. One of the more painful spectacles of modern science is that of human geneticists piously disavowing the existence of races even as they investigate the genetic relationships between 'ethnic groups.'"

