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## Ancestry is uncovered via DNA

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There will come a day when a genealogist can take any two people from anywhere in the world and show them how they are related to each other — that's if the Sorenson Molecular Genealogy Foundation (SMGF) has anything to say on the matter.

The nonprofit organization is one of the leaders in the relatively new field of molecular (or genetic) genealogy. This rapidly evolving science, which combines traditional genealogical records with DNA-test results, allows researchers who are genetically linked, but have never met, to compare family history information, possibly furthering their research.

Scott Woodward, chief scientific officer of GeneTree, a DNA-testing company that works closely with SMGF, said DNA has caused people to think of their family in a slightly different way. Rather than limiting the word "family" to include only one's ancestors, he wants people to expand their family circle to include their genetic cousins — those who have virtually the same DNA.

"Analysis of DNA allows us to expand that family tree out four, five or 10 generations, to places that aren't typically covered by genealogy charts," Woodward said.

Based on recent mathematical and genetic research by other scientists, Woodward believes that a common ancestor can be found between any two living individuals within, at the most, 10 to 15 generations, or 750 years.

### What genetic genealogy does

Woodward said DNA testing is beneficial to genealogists in two specific instances. First, it may help determine a relationship between two ancestors, or eliminate some of the possibilities. For example, if there are several Smith families in the same community, testing descendants from two different Smith lines could determine if they are related or merely share the same name.

DNA testing can also help genealogists trace their family past a name change, whether by spelling changes, adoption or marriage.

"In most Western cultures, when a woman marries and has children, she takes the name of her husband. At each generation, the maternal surname changes," Woodward said. "It is difficult in traditional genealogy to trace those lines."

While DNA will not provide the person's original surname, it can provide a clue to possible surnames, or help to confirm or dispute theories. Bennett Greenspan, president and founder of Family Tree DNA, another genealogy-based DNA testing service, has experienced this first hand.

"Names change and our ancestors have been able to erase the footprints that they left in the sands of time," he said.

Originally, Greenspan hoped DNA testing would help him discover his own immigrant ancestor. He thought by getting in touch with other Greenspan researchers, he would be able to compare notes and perhaps move forward in his research. However, he discovered that none of the other Greenspan men who live in the United States were related to him.

"It's been a surprise and kind of a shock," he said. "I never would have believed that if someone would have told me that eight years ago. I thought I ought to be related to some of them, but I'm not related to any of them. Now, I'm starting to think that my elusive immigrant ancestor changed his

name.”

### What DNA testing won't do

According to estimates by the American Society of Human Genetics, half a million Americans will purchase genetic ancestry tests this year. However, the organization has been critical of genetic DNA testing.

“For some groups (some Native American tribes, for example), a major concern about scientific efforts to explain origins is the apparent diminished regard for important cultural, religious, social, historical and political processes that also inform group origin, membership and identity, and access to group rights,” ASHG cited in a press release. “Some related issues include the use of genetic ancestry information as the basis for: changing one’s identity on various government forms; making claims to certain group rights or benefits; and immigration purposes, such as seeking dual citizenship. These issues are of increasing practical concern and likely to become more so in the future.”

For now, ASHG urges DNA-testing companies to help educate the public as to the limitations of DNA. Some of the largest companies are already working toward that goal.

“It is important that people understand that when they get a DNA test, it is not going to answer all of their genealogical questions,” Woodward said.

For instance, current testing does not cover everyone in a person’s family tree. Depending on which test is conducted, the results will only tell of a person’s mother’s mother’s mother or a man’s father’s father’s father. A paternal grandmother, for example, will not be included in the results. Woodward expects that within the next year, testing will include a person’s complete pedigree, but for now, tests are very limited.

Ancestry is not always easy to determine, either. Greenspan explains that while DNA testing can determine Native American ancestry, for example, it cannot confirm which tribe a person descends from. The same is true in Western Europe — DNA may confirm European ancestry, but not necessarily distinguish between French or German or English.

Yet another limitation, and one that concerns ASHG, relates to how the test is conducted and how the results are interpreted. In some cases, false results have been delivered to individuals because the tests were not detailed enough.

“The more detailed the test, the more accurate the results,” Greenspan said.

### How it all works

There are two types of DNA that interest genealogists.

n Y-chromosome DNA (Y-DNA) is passed virtually identically from father to son to son and so on. A DNA lab looks at records numbers found at specific locations, or markers, on the DNA structure. These numbers are referred to as a “haplotype.” Individuals with the same haplotype and same surname are likely related.

“Men who share a common paternal ancestor will have virtually the same Y-DNA,” states SMGF. “Even if that male ancestor lived many generations ago.”

Individuals can choose the number of markers they wish the lab to examine — the higher the number, the more recent the connection to a common ancestor will be. Woodward recommends a 40-marker test at a minimum.

Since this is the chromosome that makes a person male, women do not have Y-DNA and cannot be tested for it. Experts recommend women tracing their paternal line have their brother or father tested.

n Mitochondrial DNA (mtDNA) is passed from mother to child. Daughters then pass their mother’s mtDNA onto their children. Since it takes 500 years or more for mtDNA to mutate, or change, scientists have been able to follow mtDNA, genetically speaking, all the way back to the Mitochondrial Eve, or the mother of all mankind.

According to Greenspan, mtDNA tests can determine if two females are related, their suggested geographic origin, and their deep ancestral ethnic origin. Two persons with the same mtDNA, likely

have a common maternal ancestor in the past 500 years.

When testing mtDNA, scientists examine the mutations in one, two or three selected regions — HVR1, HVR2 and HVR3 — and compare those to a standard reference set. To avoid possible confusing or inaccurate results, Woodward recommends having all three regions examined.

### **DNA testing**

Getting a sample of DNA is simple — it's a swipe on the inside of the cheek. However, deciding which company to order from and which test to choose can be a bit overwhelming. To start, Woodward recommends looking for companies that have large databases, continue to work in research, explain and help interpret test results, and offer detailed tests.

"I would try and get the largest amount of DNA information that I could afford," Woodward said.

## **Additional Facts**

### DETAILS

DNA-testing companies  
[www.FamilyTreeDNA.com](http://www.FamilyTreeDNA.com)  
[www.GeneTree.com](http://www.GeneTree.com)

Sites to share results  
[www.mitosearch.org](http://www.mitosearch.org)  
[www.ysearch.org](http://www.ysearch.org)  
[www.smgf.org](http://www.smgf.org)

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