

GENETICS & GENEALOGY

DNA Q&A

by Curtis Rogers

THIS ARTICLE INTENDS TO ANSWER QUESTIONS AND concerns about genealogical DNA testing. The author hopes to encourage as many people as possible to include this method in their family history search.

Why should I get a genealogical DNA test?

As a reader of these pages you undoubtedly are aware that genealogical DNA testing has removed countless brick walls and opened new roads of family exploration.

The information this test will provide is not limited to recent generations. Bryan Sykes, Professor of Human Genetics at the University of Oxford and author of *The Seven Daughters of Eve*, believes that the vast majority of European matrilineal lines may theoretically be traced to seven women, the oldest of whom lived some 45,000 years ago. Large populations identified as originating in the distant past are termed “haplogroups.” If you are of European background, a DNA test can reveal to which of these seven women, or haplogroups, you belong. Similar information is available for female lines originating in other regions of the world. Male haplogroups can also be identified.

Equally exciting is the research on sub-groups of these haplogroups, “subclades,” that split from the haplogroup more recently. Their areas of origin may be pinpointed as well. Like layers of an onion, subclades are being found within subclades, revealing ever more recent family history. To illustrate the value of these discoveries, think of African-Americans who previously had no way to trace their ancestral history. As subclades of the African haplogroup are discovered, African-Americans may be able to learn when and where in Africa their ancestors originated. Similar subclade information is available for lines in Europe and elsewhere.

Once your DNA is analyzed, you can receive updates with new information as to how your direct male or female lines developed long ago.

I know that DNA is the material from which our genes are made. If I get my DNA tested for genealogical purposes, will it be possible to know what genes (good or bad) I may have?

Neither you nor anyone else will have any insight into your genes based upon a genealogical DNA test. In addition to genes, vast stretches of DNA have traditionally been thought to have no function. These strings of material are often referred to as “junk DNA” and these areas of DNA, rather than coding genes, are examined in genealogical tests.

Can genealogical DNA testing be used by the FBI and other law enforcement agencies for criminal investigations?

Don't worry about getting picked up for unpaid speeding tickets; there are big differences between DNA testing by law enforcement and DNA testing for family history. The objectives are entirely different: law enforcement seeks to discover what is *unique* in individuals to find that “one in a million” person. Genealogists wish to find *similarities* in individuals so they can connect with relatives, even if common ancestors lived generations or thousands of years ago. Law enforcement tests are performed on DNA that contains genetic material from both parents, hence immediate uniqueness. This uniqueness may be determined in measuring just a few sites — thirteen is typical. On the other hand, genealogists test for DNA passed from only one parent (Y-DNA from the father, mtDNA from the mother) and the more sites (called “markers”) tested the better. Reasonable definition generally requires twenty-five or more markers.

How can there be DNA from only one parent? I thought humans required genetic material from both parents.

That is true; we do need a mother and a father. However, in two significant instances DNA is passed to a child without being diluted by the other parent's DNA. These two exceptions are the basis for genealogical DNA testing.

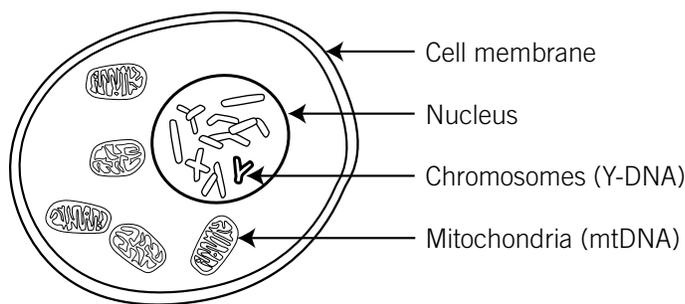
The first exception is our ability to trace male lines through DNA passed only from the father to his male children. You undoubtedly recall that the factor which determines whether a baby is male or female has to do with X and Y chromosomes. Females have two X chromosomes, males have one X chromosome

and one Y chromosome. The Y chromosome is always passed only from the father. All DNA in the entire Y chromosome (called Y-DNA for obvious reasons) can be traced from a man to his father, his father's father, etc. This DNA will never be modified by mixing with a mother's DNA. The limitation of Y-DNA is that a woman cannot trace her male (father's) DNA history from her own DNA. She can, however, obtain this information from a genealogical DNA test her father or a male relative of her father (e.g., brother, male cousin, or uncle on their father's side).

Only men can trace their direct male lines. May I assume that only women can trace their direct female lines?

No, both males and females have DNA by which their direct female line may be traced. This difference is the second exception referred to earlier.

Every living cell in our bodies is powered by bits of material called mitochondria. These energy machines exist outside the cell's nucleus and have their own set of genes (hence DNA) passed to the child by the mother. As with Y-DNA, over time mitochondrial DNA (mtDNA) changes (mutates), making identification of haplogroups and subclades of the direct female line possible.



We can trace unbroken "female to female" lines and unbroken "male to male" lines. What about lines that are "broken," such as my mother's father, or grandfather's mother? Will a genealogical DNA test give me any insight into their ancestral lines?

It is true that you inherited genes and DNA passed to you by these ancestors. DNA inherited from these broken male or female lines is called "autosomal DNA." Researchers are trying to determine how autosomal DNA can be used for genealogical purposes, but at present it is useful only for recent (say three to four) generations, and paternity cases.

Will DNA testing hurt?

No. The testing company will send you a kit with a swab and return envelope. DNA will be collected simply by rubbing a cotton swab against the inside of your cheek. The only pain might be a pinch to your wallet.

Above: Direct male family lines are traced with Y-DNA found in the cell nucleus, female lines are traced with mitochondrial DNA found outside the cell nucleus. Illustration by Laura Vriesema.

How much will it cost?

About \$130 plus shipping and handling for an mtDNA test, or double that for a Y-DNA test, should guarantee professional results. Variables include the testing company, the number of markers tested, whether you (if you are male) want to combine mtDNA and Y-DNA tests in the same reading, etc. With a quick computer search I found a company offering a twenty marker Y-DNA or maternal DNA test, either for \$119 (plus \$12 shipping). If these prices are out of your range, you may find a group with the same family name as yours (a surname project) that may be able to assist with your DNA test, particularly if you are from a line they need for their genealogical analysis.

Are there any negatives to the test?

Once you mail your swab to the testing company, you will have to wait three or more weeks for results. If you are as excited as most people about forthcoming insights into your family history, three weeks will seem like a long, long time.

Once I get my genealogical DNA test results, how do I find possible cousins, or information that may help with my brick wall?

First, you will want to make your information available to any DNA surname project of interest. NEW ENGLAND ANCESTORS publishes this information in "Family Focus" under the heading "DNA Studies in Progress."

Several sites allow you to post DNA information as part of surname projects. These sites include Family Tree DNA (www.familytreedna.com), Ysearch (www.ysearch.org), and Sorenson Molecular Genealogy Foundation (www.smgf.org). If you are uncomfortable with using a computer, consider asking a family member or friend to help. Most people expect to "meet" other people with similar genealogical interests online.

Then what happens?

You will probably be notified of several matches to your DNA soon after posting your results. You will continue to receive notices of matches from the company that performed the tests. Many matches will be with people of different surnames; you may or may not share a common ancestor. Over time you will begin to identify potential relatives based on the number of

markers matched, the surname, or the ancestral location. You may have an exact match for twelve markers but not with twenty-five or thirty-seven markers.

Your testing company can probably provide you with a description of your haplogroup, and perhaps subclades, although there may be an additional charge. With a little research you can find where this haplogroup existed in its heyday.

We are in the Model T stage of genealogical DNA research. Perhaps several hundred thousand individuals have their DNA available for genealogical purposes. That is a lot. But think of the information that will be

available when this figure reaches millions. I want to be a part of that! ♦

CURTIS ROGERS wrote of his research for his *Rogers and Yorkshire ancestors in the holiday 2006 issue of NEW ENGLAND ANCESTORS*. He is the administrator of the *Rogers surname project* and can be reached at rogersdna@gmail.com.

("That Merciless Element" continued from page 40)

² Elaine Forman Crane, *A Dependent People: Newport, Rhode Island in the Revolutionary Era* (New York: Fordham University, 1985), 3-4, 23.

³ For more on the Malbone family's prominent role in the Triangle trade, see *A Dependent People*, 31, 53-55. For the identities of some of the Malbone slaves, see *A Dependent People*, 80. For the best genealogical treatment of the Malbone family in print, see *Genealogies of Rhode Island Families from Rhode Island Periodicals* (Baltimore: Genealogical Publishing Company, 1983), 2: 834-59. A typescript entitled "Malbone Papers" is at the Rhode Island Historical Society.

⁴ See *Newport Mercury*, November 29 and December 20, 1762, June 27, 1763, May 14, 1764.

⁵ *Newport Mercury*, 28 January 1766.

⁶ *Newport Mercury*, June 2, 1766.

⁷ *Newport Mercury*, August 31, 1767.

⁸ *Boston News-Letter*, September 3, 1767. *The New-York Journal* of September 3, 1767 reported, according to two mariners from Rhode Island, that the *Dolphin* was carrying "between 3 and 400 Hhds. [hogsheads] of Jamaica Rum."

⁹ Richardson Wright, *Revels in Jamaica 1682-1838* (New York: Dodd, Mead, & Co, 1937), 51-53.

¹⁰ *Newport Mercury*, August 31, 1767, and the *New-York Journal*, September 3, 1767.

¹¹ This letter is quoted in *A Dependent People*, 80.

¹² *Newport Mercury*, September 14, and September 21, 1767.

¹³ *New-Hampshire Recorder*, September 16, 1790.

¹⁴ *Anne Bradstreet: America's First Poet, Selections from Her Works* (Newburyport, Mass.: Newburyport Press, 1998), 34-35.

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("Computer Genealogist Spotlight" continued from page 45)

are Harvard University Archives' Biography Research Guide, which allows users to search biographical records on past Harvard students and professors, and the University of Aberdeen's Scottish Emigration Database, which includes ship passenger records for twenty-one thousand passengers and emigrants departing for non-Scottish ports from 1890 to 1960.

The photograph collection from Harvard's Social Museum, an outgrowth of an early twentieth century social reform effort, is worth special mention. The photographs include images by pioneering documentary photographers such as Lewis Hine and depict living and working conditions for immigrants and the poor in fifteen states and the District of Columbia. These images can be accessed by category through the

immigration site or, as a searchable database, through www.artmuseums.harvard.edu/socialmuseum.

Immigration to the United States, 1789-1930 provides a wide array of great resources for exploring the context of your immigrant ancestors' lives. ♦

CONNIE REIK, MSL, MA, has been a reference librarian for more than fifteen years and is the government publications coordinator at Tisch Library at Tufts University. History is one of her areas of expertise in instruction and research. She has been researching her family for more than twenty-five years and is vice president of the Massachusetts Society of Genealogists.