Ewing Surname Y-DNA Project Article 2

This is the second in a planned series of articles about the Ewing surname Y-DNA project. The first article appeared in the last issue of this Journal. It reviewed some basic information about chromosomes in general and the Y-chromosome in particular. In this article, I want to clarify a couple of points folks have raised questions about, and then update you on the progress of the project.

Where does a man's Y-DNA come from?

Sketch yourself a standard pedigree, maintaining the convention that the parents of each person in the tree are shown above him or her with the father on the left. At the level of great grandparents, there will be eight individuals—four great grandfathers and four great grandmothers, seated boy-girl-boy-girl, just like at a dinner party. If you have patience enough and a big enough piece of paper, at the level of 8th great grandparents there will be 1024 individuals, assuming nobody married a cousin (which they almost certainly did, but we are dealing with theoretical matters here, so let's ignore the facts). Reading across this level from left to right, we will find first an 8th great grandfather, then an 8th great grandmother, and 8th great grandfathers alternating with 8th great grandmothers all the way across the very wide page. Now, if you have a computer or a couple hundred monks and an acre of parchment, you can extend the pedigree back to the level of 18th great grandparents (20 generations). This level will have 1,048,576 individuals, half of them 18th great grandfathers and half of them 18th great grandmothers, arranged boy-girl-boy-girl across the now almost certainly imaginary page.

Now if you put yourself at the bottom of this diagram, you can trace your lineage through a huge number of lines to each of these 1,048,576 ancestors. So, where did you get your Y-DNA? If you are female, you didn't get any—Y-DNA is a kind of genetic defect that causes a perfectly good potential female to become deformed into a male. If you are a male, you got it from your dad. And he got it from his dad. And you can follow the leftmost branch of the pedigree all the way to the top; at the very left end of the 1,048,576 18th great grandparents is the 18th great granddaddy who is the source of your Y-DNA. If everybody kept real good notes and there was no fooling around, he should also have your same surname. But his overall genetic make-up only contributed less than one millionth of what makes you who you are.

I have been asked if Y-DNA testing can confirm Native American ancestry. As you can see, this would only be possible if there were an unbroken male line back to the Native American ancestor. If your great great grand**mother**'s father were Native American, your dad wouldn't have his Y-DNA. If there is an unbroken <u>female</u> line back to the Native American ancestor, we could confirm this with mitochondrial DNA testing.

Mitochondrial DNA (mtDNA)

The 46 chromosomes in the nucleus of every human cell are not the whole genetic story. Cells also contain some amazing little pieces of machinery called mitochondria. They are the power plants of the cell, where carbon fuel is "burned" to provide energy for everything the cell does. The mitochondria contain their own DNA, in the form of a single circular chromosome. This chromosome looks very like bacterial DNA; indeed, the mitochondria are thought to have descended from what were once parasitic bacteria, but that is another story. Mitochondria are passed only from mother to child. This is true because while mitochondria are in both egg and sperm, in sperm they are only in the tail section, which drops off as the head of the sperm enters the egg to fertilize it. Both men and women have mitochondria that have been passed down the rightmost branch of the big diagram we constructed a couple paragraphs above. Although mtDNA is passed from mother to children of both sexes, only the daughters can pass it on to the next generation, so mtDNA follows only the female line. In principle, mtDNA could give us as much information about our maternal line as Y-DNA does about our paternal line, but the rate of mutation in mtDNA is enough slower than in Y-DNA that we don't get too much information of genealogic interest. There are only seven distinct types of mtDNA in Europeans, so they are of not much use in distinguishing branches of families, but they do provide fascinating evidence of early human history. An interesting book on the subject is The Seven Daughters of Eve, by Bryan Sykes. mtDNA testing is available at a discounted rate through our Ewing Surname Project website, but it is not a part of the project.

Medical and Legal Implications

What we are doing in the Y-DNA project is determining the number of "repeats" in up to 37 "microsatellite loci" on the Y-chromosome. "Loci" just means places; we also call these places "markers." Microsatellites are also called "short tandem repeats" (STRs). (I have finally found out why they are called microsatellites, but it turns out not to be interesting enough to explain here—call me if you can't stand not knowing.) Microsatellite loci typically have from 10 to 30 repeats of a sequence of 4 "nucleotides" (letters in the genetic code). We say that a mutation has occurred when a copying error is made such that an additional repeat is added or one is dropped. Microsatellites sometimes get called "genes" but they are not really genes, because they don't get translated into proteins. They are codes that don't code for anything; they just get passed on because they are copied along with everything else. If a microsatellite is a little longer or a little shorter or even completely gone, it doesn't cause any disease or any other difference in the person who has the different arrangement. Theoretically, a certain pattern of microsatellite repeats could be associated with a defective, disease causing gene elsewhere on the chromosome, but as a rule defective genes on the Y-chromosome result in sterility. There are only 27 genes on the Y-chromosome; one is the sex-determining gene and many of the others are involved in making sperm. This means that it is exceedingly unlikely that you received a defective gene from your father—men with defective Y-chromosomes

don't leave offspring. The short story is that Y-DNA haplotypes (microsatellite patterns) don't convey any medical information that I know about.

Microsatellite patterns (haplotypes) are not "unique enough" to identify specific individuals. If they were, I could sue Chancellor George W. Ewing for paternity—he has exactly the same pattern as me! On the other hand, it would be possible to learn some rather embarrassing things from Y-DNA testing. If a father and son both took the test and happened to have clearly different haplotypes, this would be convincing evidence that they were not actually father and son. So having identical haplotypes doesn't prove much beyond providing probabilistic evidence of a genealogic relationship in five or ten generations, but having clearly distinct haplotypes can prove that such a relationship does not exist. Exactly how much difference there has to be to rule out relationship is an issue we are exploring in our surname project.

A good book for beginners in using genetics in genealogy is Trace Your Roots with DNA, by Megan Smolenyak and Ann Turner. A good book on using DNA to follow ancient human migration patterns is Mapping Human History, by Steve Olson. If you have a sophisticated grasp of statistics and calculus, there is a more advanced and technical text designed to be used in graduate level science courses called Human Evolutionary Genetics, by M.A. Jobling, M.E. Hurles and C. Tyler-Smith.

Results

We now have fourteen project participants. We have complete 37-marker results on seven participants, and 12-marker results on two more, one of whom is waiting on more results. These are still at the lab; when someone orders 25 or 37 markers, the 12 marker results come out before the rest of them. Three new participants also have samples that are still at the lab, and two more participants have just submitted samples that have not yet arrived at the lab. It is still too early to make too much of the results, but it appears to me that all but one of the Ewing men for whom we have results are related within a genealogic time frame. The one McEwan man is also not related. We have a pair of Ewing third cousins who are at "genetic distance" of 2 from one another. If we ignore for the moment the one of them who is most different from the rest of us that I believe to be related, we are all within a genetic distance of 2 from one another. Just to give you a sense of proportion, the unrelated men I mentioned are at genetic distances of 20 and 22 from Chancellor George Ewing and I, who have identical 37-marker profiles. In the next issue of the Journal, I plan to explain more about the concept of "genetic distance" and how we are analyzing these results—and, if you join the project soon, your results will be among those analyzed!

There is also another interesting possibility to report from the 12-marker data we have so far. There is an "Irish haplotype" being talked about in some of the DNA chat rooms. This is the pattern 25, 11, 14, 13 at the four loci DYS390, DYS391, DYS392 and DYS393 respectively. (Most microsatellite loci are named "DYS"

followed by a number. I don't know what DYS stands for, if anything.) Two of the eight men for whom we have 12-marker results are clearly not related to the other six. Of these six, three have exactly this pattern and the other three are off by one repeat at one of two different loci, which could be due to relatively recent mutations. What is interesting is that the so-called Irish haplotype is thought to be associated with Gaels rather than Bretons. Many of us had thought that the name Ewing originated in Celtic Breton tribes in the Scottish lowlands, but this result suggests that they may have been among the Gaelic Scotti who invaded Caledonia in the 6th century. Wouldn't that be interesting?

To Join or Get More Information

If you are ready to join the project, go to

http://www.familytreedna.com/public/ewing,

then click on "Join this group" at the top of the blue section on the left of the page. You can also see a table of our results there if you will scroll down to the bottom of the page. There are also links on the FamilyTreeDNA website to articles and FAQs. If you want to ask me questions, e-mail me at

davidewing93 at gmail.com.

or call me at 505-764-8704 in the evening.

David Neal Ewing
Albuquerque, NM