



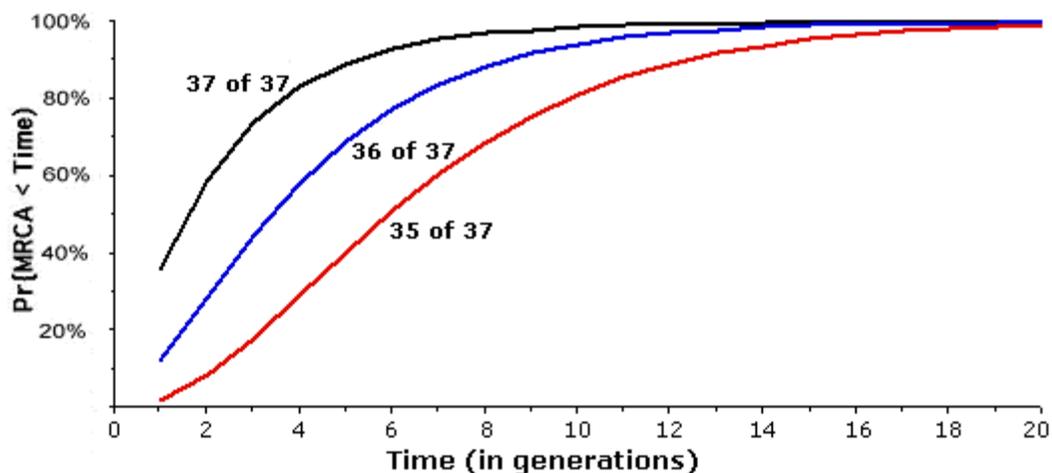
## Understanding your 37 markers

MyFTDNA Password: \_\_\_\_\_

Enclosed you will find a Certificate showing that you have had your Y chromosome DNA analyzed by Family Tree DNA. The results represent your actual allele values for 37 locations on the Y chromosome, and are listed on your Certificate. All 37 values are listed on your personal page at the web site. You may directly compare with other lab results, by uploading your results from your personal page to the public Y-DNA database at <http://www.ysearch.org/>.

These results can be compared to individuals to see how closely or distantly you may have shared that common ancestor. The rate of mutational change varies for each one of the markers. For illustration purposes, we are showing below a graph that takes into account those mutation rates. However, by referring to your personal page at Family Tree DNA you will be able to compare yourself to others that are a match or close match to you, using the FTDNATiP, which is our patent pending time predictor to the most common recent ancestor. To access your personal page, please log in from the MyFTDNA box at the right side of our home page [www.familytreedna.com](http://www.familytreedna.com) with your kit number and the password that we gave you at the top of this page.

Specifically for genealogists, if you match another person exactly you have a 99.9% likelihood of sharing a common ancestor with that person. This individual is described scientifically as the Most Recent Common Ancestor (MRCA). Population geneticists then apply a term known as the Most Likely Estimate (MLE) of when your T (time to the) MRCA would have lived, however, that is an estimate and in each individual case the actual generation could be nearer or further from the person tested. For the purposes of scientific discussion, our population geneticist feels that 20 years best expresses a typical generation prior to the Dark Ages and 25 to 27 years per generation for the period thereafter.



Since we are all related to one another if we go back far enough in time, it is important to only consider very close matches when we are using DNA to resolve genealogical questions. We have supplied you with both a graph and a chart to help you better understand the information given.

**The Graph:** In each case a common ancestor is shared between two individuals. In the case of 37/37 (a perfect match) the common ancestor is considerably more recent. For that reason, many people who share a surname will share a perfect or near perfect match. Many surnames are much older than a few hundred years and two people may share a surname but only match 36/37 or even 35/37. In these cases, as the graph shows, the MLE of when their MRCA lived could be much further back in time. Translation: you are related but probably much more distantly. Please remember that due to the general scientific estimate of the change rate of the various locations of the Y chromosome this is not, yet, a precise science.

Because mutation rates may vary between ethnic groups we provide a conservative estimate. While this may not be as satisfying it tends to error on the side of producing false negatives rather than the opposite. The science of DNA and genealogy is quite new and has been adapted from Anthropology where the MRCA is allowed to be more 'flexible'.

You are probably focusing on 'when' the MRCA actually lived. We have provided a table on the next page to help you better understand this scientific issue. The table, along with additional information available at our web site tells you, with statistical likelihood, the generation when your MRCA would have lived. For example if two people matched exactly, there is a 50% probability that the MRCA was no longer than 2 generations ago and a 90% probability that the MRCA was no longer than 5 generations ago.

In the future, we hope to be able to bring forth examples of individuals related to famous persons in history so that researchers will be able to compare themselves. At that time we will begin to list those historical figures and their alleles on our web site for your comparison.

Bruce Walsh, Ph.D., noted population geneticist from the University of Arizona provides us with this information. An expert on population genetics and statistical applications and co-author of one of the leading texts in this area, Dr. Walsh sits on the **Family Tree DNA** advisory board. His calculations are the basis for most discussions on the subject of DNA and the Time to the MRCA for genealogy today. A more extensive list of calculations is linked from our web site, as are additional graphs for your benefit.



## | Understanding your 37 markers

Number of matching markers	50% probability that the MRCA was no longer than this number of generations	90% probability that the MRCA was no longer than this number of generations	95% probability that the MRCA was no longer than this number of generations
37 of 37	2	5	7
36 of 37	4	8	10
35 of 37	6	12	14

It would be most useful to start by defining some terms.

**Point Mutation** a change in a single base pair.

**STR** (Short Tandem Repeat) A region of repetitive DNA with short units of repetition (2 to 6 basis).

**TMRCA** this term used by population geneticists indicates the **T**ime to the **M**ost **R**ecent **C**ommon **A**ncessor shared with another person.

**Locus** (plural-loci) a specific spot in the genome. A variable locus will have several possible alleles.

**Gene** the functional and physical unit of heredity passed from parent to offspring

**Y-DNA** non-recombining DNA determines whether a child will be a male or female. Y-DNA passes from father to son almost unaltered for long periods of time.

**Chromosomes** are bundles of tightly coiled DNA. Humans have 23 paired chromosomes (22 pairs of autosomes and a single pair of sex chromosomes). A single chromosome of each pair is passed from each parent to child

**Modal** comes from the statistical term Mode, which means the value at which an absolute or maximum occurs in the frequency distribution of the variant.

**Genotype** the actual alleles present in an individual.

**Haplotype** is a genotype of genetically linked loci that are inherited in a block as a single unit.

**Modal Haplotype** (MH) Definition: any person who exactly matches the alleles found to be most common (Modal) among the descendants of a person. A person who matches 20 alleles while being 1 allele off in only 1 locus will be considered to be in the haplogroup, rather than in the family haplotype.



## | Understanding your 37 markers

On your certificate, we have listed 37 of the loci that are utilized by the University of Arizona to determine the degree of relatedness, in both genealogical and anthropological terms, of diverse populations. Michael Hammer, Ph.D., who sits on the **Family Tree DNA** Advisory Board, oversees this work as the director of the Genomic Analysis & Technology Core (GATC) facility. Dr. Hammer also has appointment to the Department of Anthropology and the Department of Ecology. He co-authored the first paper showing that present day ‘Cohanim’ are descended from a single male ancestor and is the discoverer of the ‘YAP’ marker on the Y-chromosome commonly used in population studies today.

**Resolution:** Your Family Tree DNA test examined 37 specific locations on your Y chromosome. More genetic markers allow us to determine your TMCRA with tighter accuracy and greater specificity as found in the Table on page 2. A greater number of Loci do not increase the chance that you are related to someone. Scientists will tell you that if we go back far enough we are all related however the greater number of markers dramatically reduces your projected TMRCA with another person...the essence of most genealogical pursuits.

Please note on your personal page our database of Recent Ethnic Origins. This is a collaborative project between **Family Tree DNA** and the **University of Arizona**. The REO database, accessible from our web sites main page requires a sample number (listed on your certificate), and a password that was emailed to you in the last few days—also at the top of page one. This code should not be shared with others. It will also allow you to order additional tests, or refinements, under your name and using your DNA, from our web site.

If you have misplaced your password you may email [info@familytreedna.com](mailto:info@familytreedna.com) to obtain it. Once you have your results you may also want to match your results to [Ysearch](#) and to an European Forensic database located at <http://www.ystr.org>

For valuable education aids see: <http://www.familytreedna.com/dna101.html>

We have plans to continue to offer new innovative ways to trace your families’ anthrogenealogy in the future so it would be prudent to return to the web site from time to time to see what new and innovative opportunities exist for you. While there remember to search for your surname in our Surnames Database Library to see how the Library continues to grow.

It has been a pleasure to serve you. If you have questions please visit our web site at: **FamilytreeDNA.com** and read our ever-expanding FAQ or inquire via email to [info@familytreedna.com](mailto:info@familytreedna.com).

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