



Surname **DNA** Journal

www.surnamedna.com

Introduction to Genetic Genealogy

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<http://www.surnamedna.com>

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Topics

- Type of DNA used in Genetic Genealogy
- SNP vs. STR Measurement
- DNA Relationship Grouping
- Identifying Geographical Origins



Genetic Genealogy

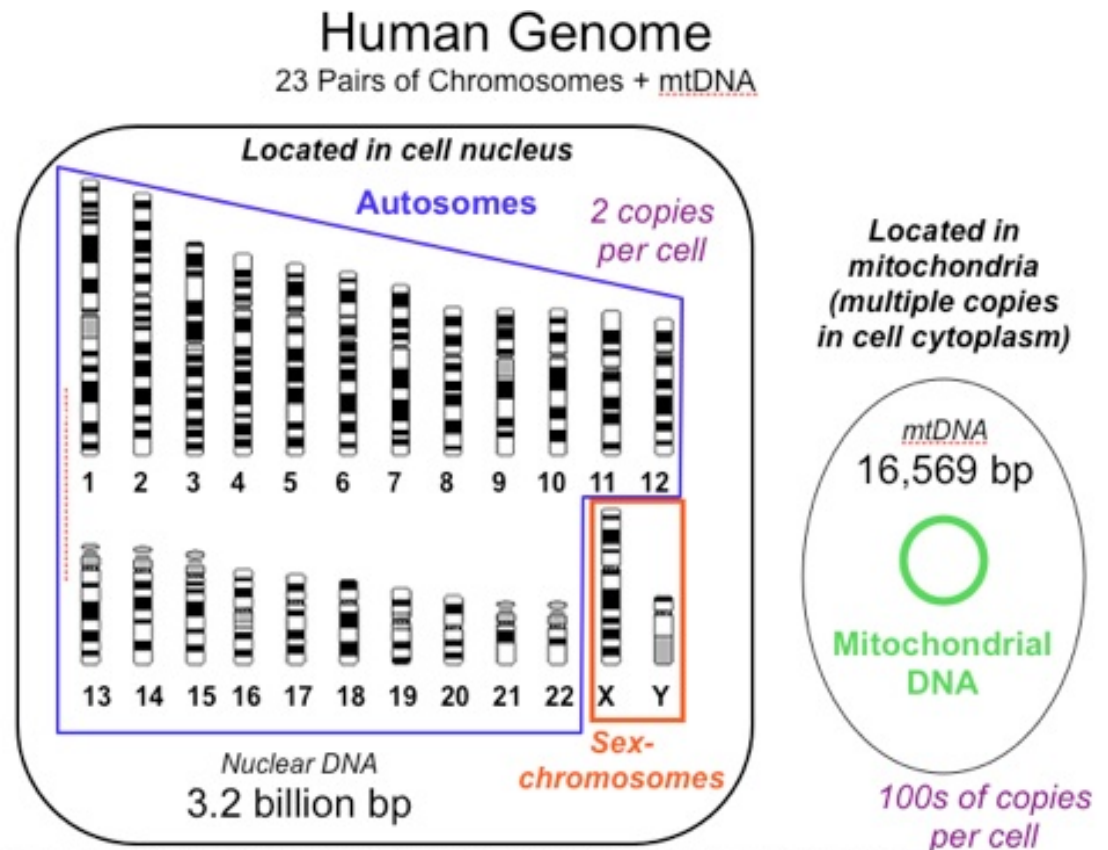
- Genealogy
 - First genealogy society (NEHGS) 1845
 - *Who* were our ancestors?
 - *Where* Do We Come From?
- Genetic Genealogy
 - Family Tree DNA founded in 2000
 - Use of genealogical DNA testing to determine the level and type of relationship between individuals.



Types of DNA

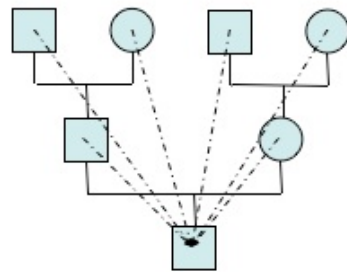
Three main types of DNA testing from a genealogy perspective

1. Y-Chromosome
2. Mitochondrial (MtDNA, from the mother's egg cell)
3. Autosomal (chromosomes 1-22)

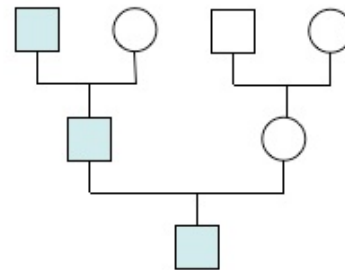


Chromosome Fit for Genealogy

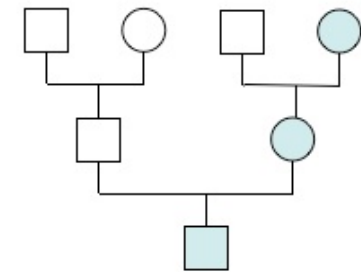
	Autosomal	Y-Chromosome	Mitochondrial
Recombination - Mixing	Yes	No	No
# Coding Genes	~ 30,000	86	37
# Markers Initial Test	708,093	37	1,120
Mutation Rate	0.5 bp/gen = 354,047 per generation	$\mu = 0.0041\text{bp/gen}$ 1 change per 165 years	0.48 bp/MY = 1 change per 1,860 years



Autosomal
(passed on in part,
from all ancestors)



Y-Chromosome
(passed on complete,
but only by sons)



Mitochondrial
(passed on complete,
but only by daughters)

SNP vs. STR Measurement

- SNP = Single Nucleotide Polymorphism
- Mutation in a single base pair at a specific position
- Expressed a 'positive' when different from all other human beings.

– e.g. position *rs1019875*

– Person1 T A T C C T = -

– Person2 T A C C C T = +

- Analogous to '*Trunk and Branches of the Tree*'



- STR = Single Tandem Repeat
- Repeating patterns of multiple base pairs
- Allele Count = number repetitions of a particular pattern

– e.g. *DYS389*

Person1 T AACC T = 1

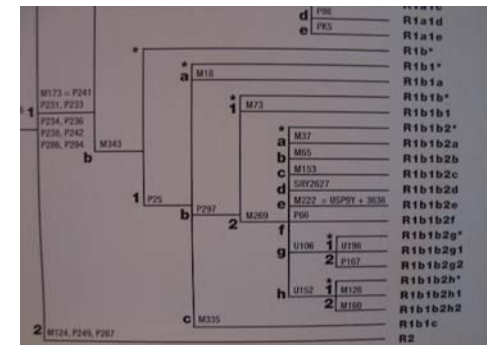
Person2 T AACC AACC T = 2

- Analogous to '*Leaves on the Tree*'



DNA Relationship Grouping

- **Haplogroup**
 - Major branches of human tree
 - (e.g. 40 branches for all humanity)
 - Always measured with SNP mutations
 - As the number of SNPs identified grows, subordinate Haplogroups are identified.
 - e.g. M222 with haplogroup R = R-M222
- **Haplotype**
 - Sub branches of a haplogroup
 - e.g. 40 branches from within R-M222
 - Typically identified with STR patterns
 - May later be confirmed to share an SNP

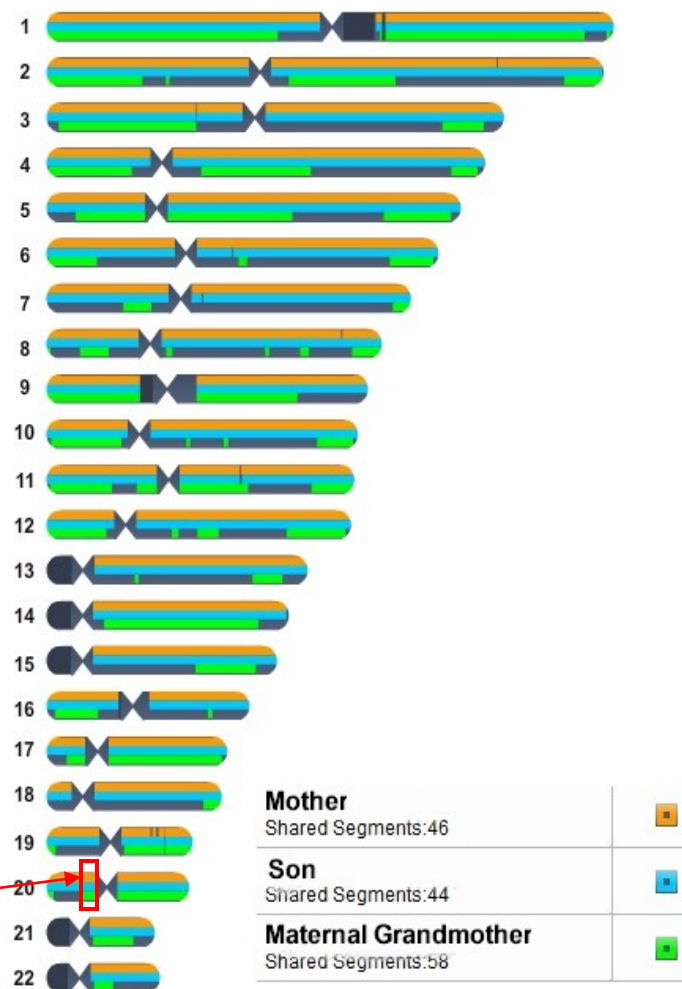


Autosomal Match Measurement

- Total and Longest Blocks of shared segments
 - express in the units of CentiMorgans (cM).

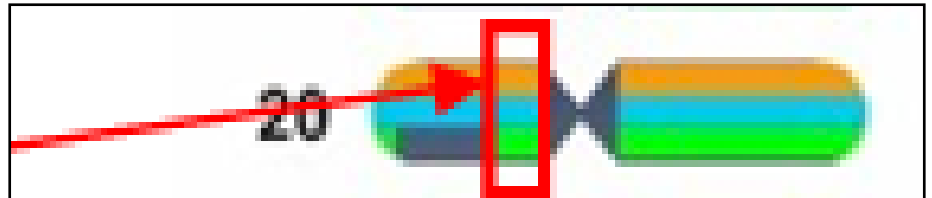
Known Relationship	Length of All Shared Blocks (cM)	Longest Block (cM)
Son	3,382	145
Mother	3,380	144
Grandmother	1,757	123

- In more distant relationships, a single shared segment can be thought of as a 'match'.



Shared Segment Measurement

- A specific portion of DNA that two or more people have in common
 - IBD = Inherited by Descent
 - DNA Segment inherited by more than one descendant of a common ancestor
- Described by:
 - The Chromosome
 - The Starting Position
 - count of base pairs from beginning of the chromosome to the point at which shared segment begins
 - The Length
 - e.g. Chromosome 20;
position 1,115,665;
50 cM



Can a DNA Test Tell Where You Came From?

- Yes – if your genetic relatives have already been tested and know their geographic origin.
- Interpretive results improve as more sampling is done in ancestral areas.
 - More Matches



Effective Geographic Identification Using Genetic Genealogy

Identification of geographic origin depends on two factors:

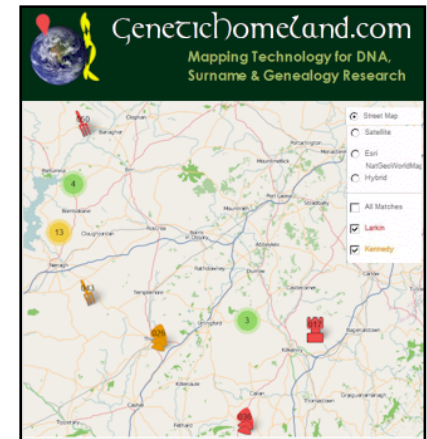
1. MATCHES with GEOGRAPHY

Having genetic matches whose geographic origin is known with precision.

2. RESOLUTION

Sufficient resolution in the DNA tests to indicate that the time-to-most-recent-common-ancestor (TMRCA) is proportionate to geographic movements.

- A match of 33 on a 37-marker Y STR test ~ 400 years.



How You Can Participate

- Get a male relative to take a Y-37 STR DNA test.
- Recruit DNA participants with known ancestral origins.
 - DNA Testing Instructional video on [YouTube.com](https://www.youtube.com)
- Link Autosomal Shared Segments to Ancestral Geography
- Sponsor Ancestral Parish Sample DNA Testing



Information Links

- *Genetic Homeland*
 - Searchable list of castles, surnames, DNA results, and place names plotted on maps
 - www.genetichomeland.com
- *FTDNA FAQ*
 - <http://www.familytreedna.com/faq/>
- *Surname DNA Journal*
 - <http://www.surnamedna.com>
- *Your Genetic Genealogist*
 - <http://www.yourgeneticgenealogist.com>
- *DNAeXplained*
 - <http://dna-explained.com>

