

## Putting the Gene in Genealogy

### Cautionary tale

- Adoption
- Illegitimacy
- You may be a different ethnicity
- You might be a different race
- Can you handle the results?
- If you aren't who you think?
- If your parents or grandparents aren't who you think?
- If someone contacts you because they were adopted?

Kelli Bergheimer  
[kbergheimer@gmail.com](mailto:kbergheimer@gmail.com)  
Mess on the Desk  
P.O. Box 1028  
Powell, OH 43065  
614-571-1929  
<http://messonthedesk.com/wordpress/>

### DNA is part of the story

DNA is only part of the story

Still need genealogical research

Still need to learn the culture and stories of lives of people

Still need records and photos and documents

### What do we know about DNA?

Offspring looks like parents

We know there are inherited traits

### What is the human genome?

Think of a blueprint

The Human Genome Project

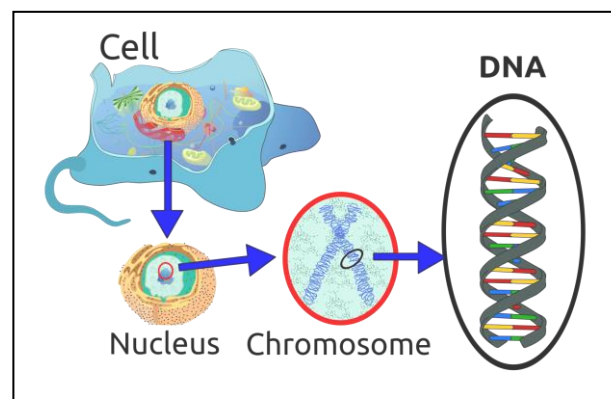
- In 1990 scientists set out to map all of the Human Genome-sequencing and mapping genes. Completed in 2003.

### What was the goal?

- Find the complete sequence of about 3 billion base pairs in humans
- Identify the 20,000-25,000 genes in humans
- Find the complete sequence of many other species
- Identify genes that are critical for life
- Identify functions of particular genes

### What is DNA?

DNA strands are made of base pairs.



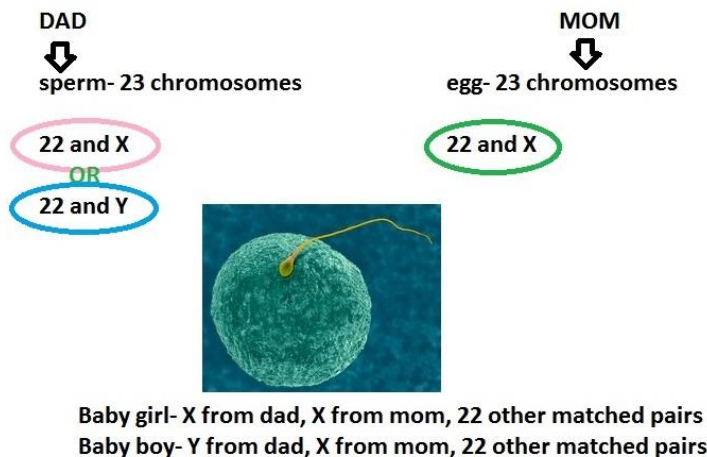
## Where is DNA?

- DNA is in all of our cells- in the nucleus- in the beginning of development.
- Eventually red blood cells lose their nucleus. It's dissolved to make room for oxygen and to reduce the cell size.
- Eventually cells for skin, hair, and nails become "cornified." The nucleus is destroyed in order to make room for keratin.
- DNA is also in mitochondria- a specialized part of the cell that generates energy a cell needs.
- Paternity tests and forensic DNA tests are different than genealogical DNA tests.

## How do we get our DNA?

During sexual reproduction, the egg contains the mitochondrial DNA and the sperm does not.

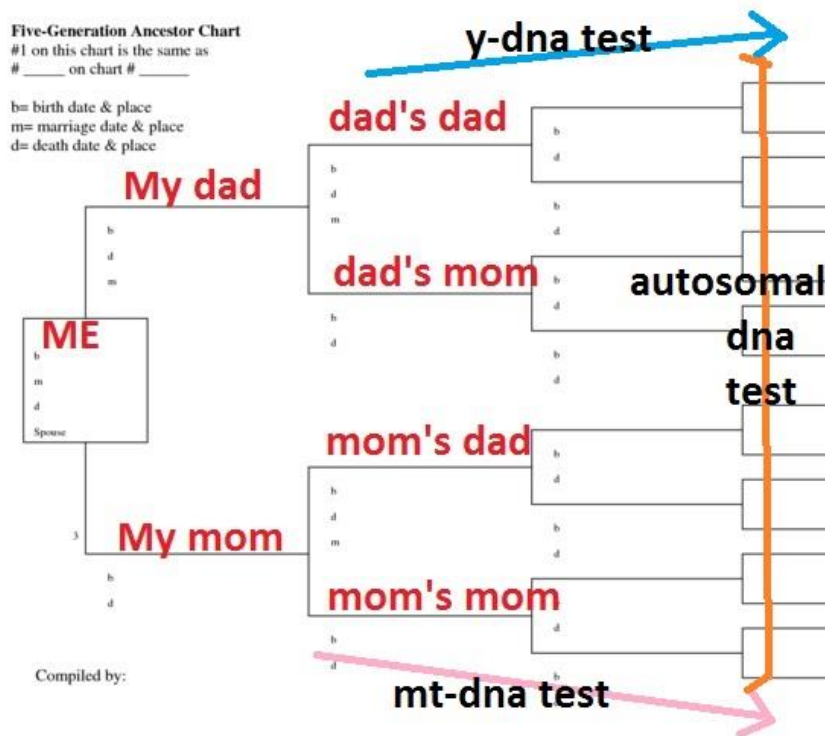
## How do we inherit 23 pairs of chromosomes?



## How are you a match with someone else?

- **Each location tested is called a SNP**– single-nucleotide polymorphism (a change at a single point in the genetic code).
- Sites in the genome where the **DNA sequences of many individuals vary by a single base** are called single nucleotide polymorphisms.
- Where two individuals share in common a number of **consecutive SNPs**, it can be *projected* that they share a segment of DNA at that part of their genomes.
- If the segment is longer than a **threshold amount** set by the testing company, then these two individuals are considered to be a match.

### 3 kinds of Genealogical DNA tests



Which test tests which DNA?

Y-DNA Test

Y-DNA (only men have y-DNA)

- Tests the male line only – sometimes called surname line
- Y-chromosome passed on from generation to generation from grandfather to father to son
- Y-DNA remains unchanged for tens of thousands of years
- Y-DNA has about 58 million base pairs

Mitochondrial DNA Test

- MT-DNA (everyone has mt-DNA from their mother)
- Tests the mother's DNA from grandmother to mother to daughter
- Mitochondrial DNA remains unchanged for tens of thousands of years
- Mitochondrial DNA has about 16,569 base pairs

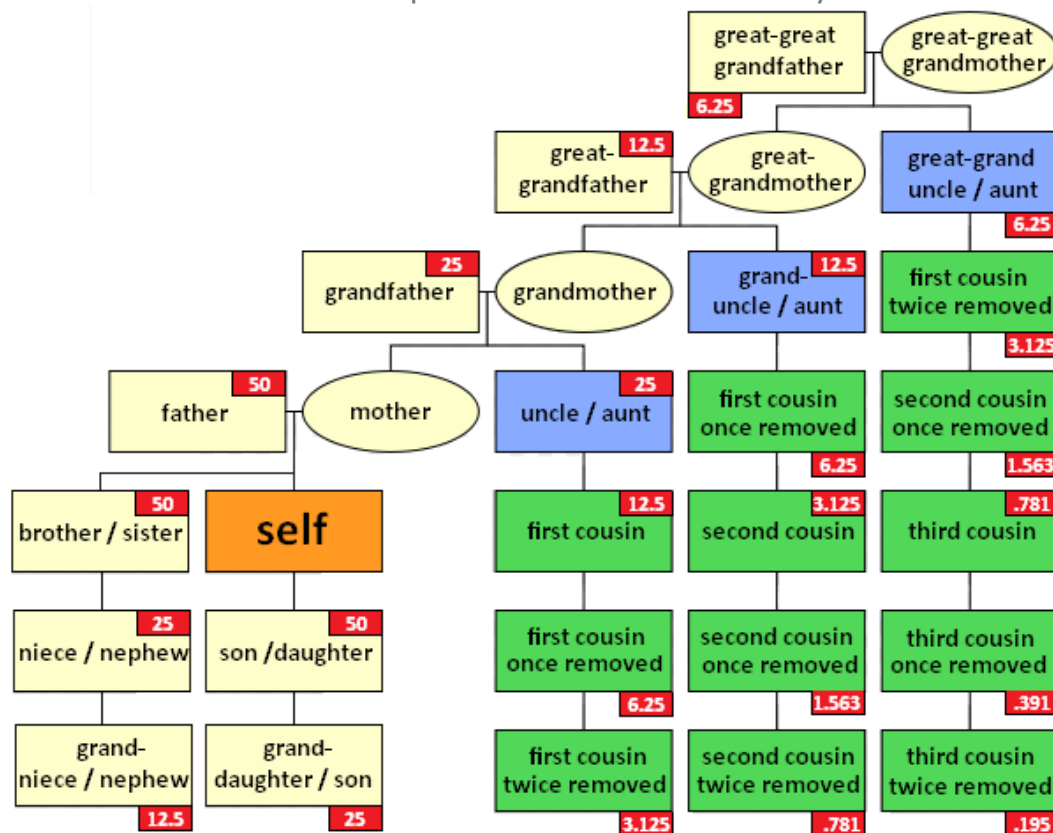
Autosomal DNA Test

- AT-DNA (a small sample of each of the other 22 pairs of chromosomes)
- Approximately 700,000 locations are tested or the 3.2 billion base pairs

How many Ancestors are we talking about?

Name of Generation	Numbers	Year	
self	1	1950	
parents	2	1920	50% from each
grandparents	4	1890	25% from each
great-grandparents	8	1860	12.5% from each
2 <sup>nd</sup> great-grandparents	16	1830	6.25% from each
3 <sup>rd</sup> great-grandparents	32	1800	3.125% from each
4 <sup>th</sup> great-grandparents	64	1770	1.5625% from each
<b>approximate autosomal accuracy line</b>			
5 <sup>th</sup> great-grandparents	128	1740	Matches in this range might be difficult to figure out. Most people don't have trees accurate back this far.
6 <sup>th</sup> great-grandparents	256	1710	

How are those relationships determined in Ancestry?



## What do percentages mean?

Relationship chart based on shared percentage of DNA:

Relationship to ME	Approximate Shared Percentage of DNA	Others Sharing Approximately the Same Percentage of DNA
Parent	50%	Full sibling Son Daughter
Grandparent	25%	Half sibling Niece Nephew Aunt Uncle Grandson Granddaughter
Great Grandparent	12.5%	Grandniece Grandnephew Great aunt Great uncle First cousin
2 <sup>nd</sup> Great Grandparent	6.25%	Great grand aunt Great grand uncle First cousin 1R
3 <sup>rd</sup> Great Grandparent	3.125%	Second cousin First cousin 1R
4 <sup>th</sup> Great Grandparent	1.5625%	Second cousin 1R

## Testing companies

*Family Tree DNA*

AT

MT

Y

*23 & Me*

AT

Health profile

*Ancestry DNA*

AT only

## Y-Test thresholds

How Many Y-DNA Markers to test?

As Many as your wallet can handle!

Always add/upgrade to more markers w/o additional testing!

12: assigns Haplogroup - Pre-Historic

25: begins a Lineage match - same surname

**37: Beginning start for Genealogy**

67: Genealogy enthusiast

111: Genealogy Nut & wallet full of \$\$\$\$

Big Y: Next Generation Seq. 11-16mbp

Learn More- ISOGG

<http://isogg.org/>

Learn More at a DIG group

<http://www.fcghs-oh.org/cpage.php?pt=17>