

DNA Results!? What Now?!

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What is DNA:

- DNA is made of 23 pairs of chromosomes. 1-22 are autosomes that carry much of the genetic code that makes you, you. The 23rd chromosome pair contains the sex chromosomes.
 - XX = female. XY = male.
- Types of DNA:
 - Autosomes (1-22), found in the nucleus
 - X DNA (23), sex chromosome found in the nucleus
 - Y DNA (23), sex chromosome found in the nucleus, passed from father to son
 - Mitochondrial DNA (mtDNA), located in the mitochondria (cellular powerhouse), outside the nucleus, passed from mother to children
- Autosomal DNA inherited in approximately equal parts (50%) from each parent
- X chromosome
 - Females inherit 1 each from mother and father
 - Males inherit only a single X from their mother
- Y chromosome
 - Passed from father to son
 - Females have no Y chromosome
 - Used to trace patrilineal heritage
- mtDNA passed from mothers to children
 - Used to trace matrilineal heritage
- The DNA you inherit from your parents, and thereby your ancestors, undergoes a process of random assortment
 - You receive 50% of each of your parents' DNA. They receive 50% from each of their parents; and so on and so on going back through time. The average percentage from each preceding generation is cut in half: 50% from parents; 25% from grandparents; 12.5% from great-grandparents.
 - You do not inherit the same DNA from your parents as your siblings. Remember the "bead" siblings.

DNA Testing and Data companies

- Ancestry has the largest pool of testers (18+ million) and limited tools
 - Autosomal testing only
 - Has added health data as an upgrade
 - Grouping, ThruLines
 - Family trees
 - Very limited chromosome information
 - The best trees
 - Genealogical records

- FamilyTreeDNA
 - Tests autosomal, Y DNA, mtDNA
 - Haplogroup estimates and terminal designations depending on tests (Y and mt DNA)
 - Free upload, \$19 unlock fee per kit
 - Chromosome browser, matrix, origins
 - Family trees
- 23andMe
 - Test only, no upload
 - Heavy health focus
 - Autosomal, but provides estimated Y DNA and mtDNA haplogroups, as warranted
 - Chromosome browser
 - Can change base person. Very helpful in determining if a match is on the same chromosome of the pair as other shared matches
 - Interesting and fun information: traits (attached/detached earlobes, dimples, red hair), Neanderthal variants
 - Genetic family tree: Auto populates a tree based on your matches. Not shareable.
- MyHeritage
 - Becoming a major player in the DNA testing market: 4+ million testers
 - Ancestry and health
 - Free upload, \$29 unlock fee.
 - If uploaded to an account with a subscription, no fee (not sure if no fee if the account was established prior to fee implementation)
 - Chromosome browser, autoclustering
 - Genealogical records by subscription
 - Photo-enhancer and colorizer by subscription
- GEDmatch
 - Data site only, not a testing site
 - DNA data from user from multiple sites
 - Many free tools, Tier 1 \$10/month
 - Law enforcement tool
 - Golden State Killer investigation
 - CeCe Moore, “The DNA Detective”
 - Opt in or out

What Does It All Mean?

- Ethnicity – highly variable between the sites; cocktail party conversation
 - Many people test for ethnicity and seldom do anything else with their data
 - Evolving test populations and algorithms mean your estimates will change over time
- Matches – the key to solving genealogical mysteries and breaking through brick walls
 - Lists start with your closest genetic matches; include predicted relationship, and amount of shared DNA

- Average centimorgan (cM) values

| Relationship | Number Direct Ancestors | Average cM | Average % |
|--------------|-------------------------|------------|-----------|
| Parent | 1 | 3,487 | 50 |
| Sibling | 2 | 2,629 | 35.24 |
| 1C | 4 | 874 | 11.72 |
| 2C | 8 | 233 | 3.12 |
| 3C | 16 | 74 | 0.99 |
| 4C | 32 | 35 | 0.47 |
| 5C | 64 | 25 | 0.34 |
| 6C | 128 | 21 | 0.28 |

- CentiMorgan = 1% shared DNA; measure of relatedness
 - Shared centimorgan Project Tool -- <https://dnainter.com/tools/sharedcmv4>

How Can I Use the Data?

- Matches – The power of DNA for your genealogical research
 - Sort/Categorize your matches using shared matches
 - Spreadsheet. Color code the match and associated shared matches
 - When complete with the first match, move to the next match not categorized
 - Ancestry provides colored dots to group matches
 - MedBetterDNA – a Chrome extension that provides full visualization of match notes on Ancestry
 - Also has hashtags
 - FTDNA
 - Matrix
 - Chromosome browser
 - MyHeritage
 - Good information for matches
 - Shared matches show how you and your match share DNA with the shared match
 - Triangulated segments
 - AutoClusters
 - Report via email
 - A different way of viewing your matches with shared matches
 - Cluster by potential family groups
 - 23andMe
 - The important information is on your match's connection page
 - Haplogroup estimates, as applicable
 - Neanderthal variants (fun)
 - Chromosome browser
 - Shared matches with shared DNA for you and the shared match
 - Chromosome browser with changeable base person

Where Do I go From Here

- Goals
- First Steps
- Learn
 - Work with your matches and tools
 - Watch webinars
 - Contact your matches

- DNA Special Inters Group (SIG)
 - Starting soon
 - Collaborative learning
- Additional tools:
 - DNAPainter -- <https://dnainter.com/>
 - Genetic Affairs -- <https://geneticaffairs.com/>
 - DNAGedcom -- <https://www.dnagedcom.com/>
 - Ancestry has severely restricted third party tool use
- Tips
 - Test older generation, siblings
 - Permission
 - Upload
 - Research plan and question; document, cite

Recommended reading and references:

- Bettinger, Blaine T., *The Family Tree Guide to DNA Testing and Genetic Genealogy, Second Edition* (United States: Family Tree Books, 2019).
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- Legacy Family Tree Webinars (<https://familytreewebinars.com/index.php>).
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- “Genetic Genealogy Tips & Techniques,” *Facebook* (<https://www.facebook.com/groups/geneticgenealogytipsandtechniques>).
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